AGRICULTURAL PRODUCTION, SUPPLY AND INSTITUTIONS IN THE POST-CIVIL WAR SOUTH

by

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This study attempts to formulate and test a set of competing hypotheses about Southern agriculture after the American Civil War. The most important question considered was whether or not the agricultural labor force was exploited. In addition, the relative productivities of blacks and whites were measured, and the desirability of cotton compared to the alternative crops was determined. The findings illuminate several of the outstanding historical issues of the post-bellum South, such as the role and position of the black population, possible sources of agrarian discontent, and whether the high levels of racial tension and political violence originated in the economic conditions characteristic of the region.

Chapter I sets the investigation in the context of some of the main problems of post-bellum Southern economic history, and introduces the major hypotheses to be tested. This chapter also presents the major conclusions of the investigation.

Chapter II is a survey of the views of contemporary (19th century) observers on the various questions under review. This evidence is contradictory, suggesting that the anecdotal historical accounts are insufficient to distinguish between the alternative hypotheses at the aggregate level.

Chapter III demonstrates that under certain assumptions plausible for Southern agriculture of this period, the theoretical difficulties associated with the coexistence of different forms of agricultural tenure, the existence and estimation of aggregate production functions and the non-homogeneity of land as an agricultural input, can all be dealt with successfully in a general equilibrium framework.

Chapters IV and V present estimates of agricultural production functions based on the county cross-sectional data in the censuses of 1880, 1890, 1900 and 1910. The production functions are specified such that the estimated values of their parameters will support one or the other of each of the alternative hypotheses on labor exploitation, productivity of the different groups of farmers, and desirability of the alternative crops.

Chapter VI presents an interpretation of the agricultural history of the late 19th century South which holds that the productivity of the different groups of farmers was determined primarily by the quality of the land they occupied, and that their incomes depended largely on their ownership of non-human factors of production. This interpretation is shown to be consistent with all the econometric evidence, as well as having support in the writings and statements of contemporary observers.

Chapter VII consists of estimates of cotton supply functions, which further test the hypotheses on the behavior and institutional arrangements of Southern farmers. The cotton supply functions are also compared to similar wheat supply functions of Western farmers in the United States which were estimated by other researchers.

The Appendices contain a further discussion of several of the theoretical and statistical points raised in the main body of the text, as well as detailed discussion of the data employed.

Thesis Supervisor: Peter Temin
Title: Professor of Economics

DEDICATION

To the landless and the poor farmers of the South whose names will never appear in accounts of the history they made.

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The two members of my thesis committee at M.I.T., Peter Temin and Franklin M. Fisher, provided me with constant encouragement, an inexhaustible supply of helpful ideas, and the constructive criticisms I needed. Credit for any of the accomplishments of this investigation should be shared with them. Other members of the economics faculty at M.I.T. provided worthwhile suggestions at various points in the research, especially Richard S. Eckaus, Evsey Domar, Matt Edel, Harold Freeman and Robert Hall. Responsibility for all errors remains mine, however. I would like to express special appreciation to the entire faculty of the Department of Economics at M.I.T., for maintaining their confidence in me through all difficulties, even when this work was slow to progress.

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Stephen DeCanio
Cambridge, Massachusetts
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I. INTRODUCTION AND CONCLUSIONS

A. The Main Questions of Post-Bellum Southern Economic History

The social and economic upheavals during and following the American Civil War were enormous in depth and magnitude. Not only did the nation stagger under the impact of the war itself, with its hundreds of thousands of battle deaths and millions of dollars of property damage, but the institutions, social conventions, and individual attitudes of both South and North were profoundly altered. Four million slaves were freed. The federal government entered into massive welfare and reconstruction work. State governments rose, fell, and rose again during the political turbulence of reconstruction. The patterns of race relations which would characterize the next hundred years began to form. Waves of agrarian discontent periodically swept over the West and the South.

In particular, the course of Southern development after the Civil War was unique in the history of the nation. In the wake of defeat, that unhappy region was characterized by exceptional levels of political and racial violence. Lynchings, tortures, election frauds, night riding, and chain gangs were widespread. The newly freed blacks were special targets of these outrages. Racial discrimination and caste-like restrictions persisted long after the abolition of the "peculiar institution" of slavery. These practices cannot be explained in economic terms alone, but an adequate description of the economic climate is a necessary precondition for understanding them.

It is natural to ask whether Southern social and legal institutions during this period were founded on some sort of economic imperative. Did the repressive atmosphere of rural life serve the economic interests of any group or groups? One promising approach to this question follows from Evsey Domar's suggestion that slavery and serfdom may originate in the availability of free land [1]. Domar's hypothesis rests on the obvious fact that if land is a free good (due, for example, to the proximity of a fertile and unsettled frontier), then no landowner can collect any income by renting out his land. A prospective tenant would prefer to move to the untouched frontier and to set up his own farm as opposed to paying any positive rent at all. Because of this, Domar argues that if land and labor are the only factors of production, the coexistence of (1) free land, (2) a free peasantry (free in the sense of being able to move, bargain for wages, etc.), and (3) a non-working class of agricultural owners which lives off rents, is impossible. If the land is free, the non-working class must draw its income from <u>exploitation</u> of the agricultural laborers, by paying them a wage less than the value of the marginal product of labor, and by controlling the state apparatus to enforce a form of slavery or serfdom on the peasants.

Domar recognizes that a more realistic model requires the inclusion of capital and management. Nevertheless, he argues that

> ...so long as agricultural skills can be easily acquired, the amount of capital for starting a farm is small, and the per capita income is relatively high (because of the ample supply of land), a good worker should be able to save or borrow and start on his own in time....But until land becomes rather scarce, and/or the amount of capital required to start a farm relatively large, it is unlikely that a large class of landowners...could be supported by economic forces alone...[2].

In this case as well as in the land-and-labor-only model, political intervention in the labor market to hold the wage below its market equilibrium level would be necessary for the maintenance of the landlords.

The Domar hypothesis seems attractive in explaining several concrete historical instances of slavery and serfdom, including the case of the United States [3]. If the existence of the frontier accounts for why slavery took such deep root in the Southern states [4], the post-bellum period might well have been marked by the development of an alternative system of agricultural serfdom or peonage. The war did not abolish the frontier. If anything, it raised the land/labor ratio through the deaths of large numbers of actual and potential farmers. In addition, the Southern planter class did not disappear. Indeed, by the end of the 1870's, many of the same individuals who had played a prominent part in the Rebellion were again in control of the Southern state governments [5]. The legal and social restrictions placed on the Southern farmer population, particularly the freedmen, may thus have constituted a re-enslavement or enserfment of the type envisioned by Domar.

Interestingly enough, at least one Southern observer anticipated Domar's reasoning [6]. In 1869, S.W. Trotti of South Carolina wrote:

> We think...nothing more certain to prevent this transformation [from laborer into proprietor] than the accumulation of population, and nothing so sure to bring it about as the present limited supply of laborers. If labor is scarce and high, and land abundant and cheap, there will soon be no laborers, but all proprietors. And when all are homesteaded, what will become of the present land-holder, the upper strata of society? They will

> suffer a degradation commensurate with the elevation of the lower orders. And who dare say, that because the hewers of wood and drawers of water are elevated, at the sacrifice of intelligence and refinement, that civilization has achieved a triumph?

Mr. Trotti unmistakably captured the essence of the Domar hypothesis, that the South, sparsely populated but endowed with abundant and fertile land, would soon be transformed into a region of independent freeholders, given the abolition of slavery and the absence of any alternative mechanism for exploitation of labor.

Any straightforward application of the Domar hypothesis to post-bellum conditions is beset with several difficulties, however. The main problem with the simple (land-and-labor-only) version is that its major premise, land's being an economically free good, was not satisfied. The price of land in the South was not zero either before or after the war. As for the more realistic version including capital costs, movement to the western frontier for purposes of homesteading was expensive. Danhof estimated that at least $1000 was required to start a Western farm in the 1850's [8], and even if the cost of starting a Southern cotton farm after the Civil War had been only half that figure, it was still probably beyond the reach of the penniless freedman or sharecropper.

The idea that there may be a link between repressive institutions and exploitation of labor does not require free land and negligible farm-making costs, however. Free land and existence of a non-working landlord class may be sufficient conditions for the exploitation of labor, but they are not necessary conditions. Equality of the wage and the value of the marginal product of labor is not a logical consequence of

the existence of a labor market. Political and economic freedoms may be abrogated to hold the wage below the value of the marginal product of labor whatever the factor ratios. A non-productive landowning class could exert its influence to restrict labor mobility, restrain competition among employers for laborers, and deny labor bargaining rights, all to the economic disadvantage of the working population. Land could have a positive price and workers might exhibit some mobility even given such exploitation of labor. Nevertheless, the labor market would be imperfect, and the society would reflect in its institutions and mores the formal and informal mechanisms of the landowners' market power.

Throughout this study, "exploitation" will be used in its technical economic sense of labor receiving a wage below the value of its marginal product. This "Robinsonian" definition of exploitation is different from the Marxian notion of "exploitation," in which the appropriation by private owners of the returns to non-human factors of production in itself constitutes "exploitation" of workers, whatever the relation between the free market wage rate and the actual wage rate. Most non-economist writers past and present use the term much more loosely than either of these precise meanings. It generally has come connotation of "unfairness," but such a concept is vague. There is usually no way to determine from purely textual analysis which meaning (or mixture of meanings) is intended. A purely competitive economy in which all factors receive payments corresponding to their marginal products may generate institutions which maintain the status quo, but it is the

Robinsonian type of exploitation which necessitates extraordinary interventions and distortions in the labor market.

Clearly, slavery before the war is consistent with this type of exploitation. It has also been implicit in the view of some historians that the economic status of the freedmen was hardly improved over their condition as slaves. According to John Hope Franklin,

> There can be no question that the majority of Negroes worked, despite Southern doubts of their efficiency as free workers. They had no other choice but to cast their lot with their former masters and assist them in restoring economic stability to the rural South....As free workers, however, they gained but little. The wages paid to freedmen in 1867 were lower than those that had been paid to hired slaves [9].

If the wage paid to a hired slave was equal to the marginal product of labor (and there is no reason to think that it would not be, since the payment was made to the slaveowner), then Franklin's argument amounts to saying that the post-emancipation wage was again set at an exploitative level. W.E. B. DuBois reasoned along similar lines, when he wrote "Property control especially of land and labor had always dominated politics in the South, and after the war, it set itself to put labor to work at a wage approximating as nearly as possible slavery conditions..." [10].

This conception of the course of Southern labor history is shared by Paul S. Taylor, who believes that for the blacks, the period following the Civil War was an "intermediate phase" in their long transformation from slaves to free men. During this transition, the blacks continued to be subjected to coercion and exploitation:

> ...The failure of the Radical Republicans to carry through their program [of guaranteeing full freedom for the ex-slaves] left the freedmen with neither land nor the political equipment of free men for their own protection. And during the struggle to attain the northern program, southern whites forged an iron determination to reestablish and maintain what emancipation had loosened, namely, their strong controls over Negro laborers.
> . . . . . .
> ...The plantation system was continuing to exert pressure to compel the freedmen to labor just as it had exerted pressure from its beginning in 17th century Virginia; and the planters were strong enough politically to enact laws to support this renewal of coercion of the laborer which seemed to them so unanswerably necessary and desirable [11].

In contrast with this view is the possibility that abolition destroyed the complex of labor market imperfections embodied in the slavery institution. In addition to its other legal and political benefits, freedom brought the blacks [12] the concrete economic gains of higher wages and income levels, as the wage was allowed to rise to its market equilibrium level. After the extirpation of slavery, the Southern economy was free to function according to the competitive ideal.

Even so, competition in the labor market may not have been sufficient to guarantee prosperity or an adequate living standard for the laborers. Kenneth Stampp argues that the deficiencies and deprivations which followed the freedmen out of slavery were the origin of many of their subsequent difficulties:

> To be sure, some of the radicals, especially those who had been abolitionists before the war, never lost faith in the Negro, and in the years after reconstruction they stood by him as he struggled to break the intellectual and psychological fetters he had brought with him out of slavery....
> . . . . . .
> Because the ante-bellum slave codes had prohibited teaching slaves to read or write, only a small minority of Negroes were literate. In this respect, as in most others, slavery had been a poor training school for the responsibilities of citizenship. It gave Negroes few opportunities to develop initiative or to think

> independently; it discouraged self-reliance; it put a premium on docility and subservience; it indoctrinated Negroes with a sense of their own inferiority; and it instilled in many of them a fear of white men that they would only slowly overcome. A writer in Harper's Weekly reminded friends of the Negroes that the freedmen were but "the slaves of yesterday...with all the shiftless habits of slavery [to be] unlearned....They come broken in spirit, and with the long, long habit of servility..."[13].

In the language of an economist, Stampp holds that the freedmen were deficient in human capital--education, work orientation, and entrepreneurship. Blacks possessed of nothing but their raw labor power would be bound to fare poorly in a competitive labor market after emancipation.

Related to the issue of black poverty is the problem of the condition of the white farmers. White incomes in the South were also lower than in the other regions [14], and the agrarian unrest that swept through the South recurrently in the late 19th century was by no means confined to blacks alone. Whites also may have been plagued by exploitation in the labor market or inadequate human capital resulting from deficiencies in the Southern educational system. In addition, the agrarian unrest of the 1880's and '90's have often been seen in terms of two related but separable issues: absence of crop diversification (cotton overproduction) and exploitation of farmers by merchants. In the standard account of the Populist movement, John Hicks has written of the South:

> The evils of the one-crop system were compounded again and again. When prices went down, the farmer, with a mounting balance against him at the store, saw no way out except to rent more land and raise more cotton. By attempting to farm too much he of course cut down the effectiveness of his work and got a smaller return per acre. He found, moreover, that his expenditures for seed, fertilizers, and supplies had increased as much as the returns from his crop, and his debt at the store might be even more than it had been the year before. But with the lesson still unlearned he sought the next year to raise more bales of cotton rather than to devise means of cutting down his purchases.

> Could he have produced for himself even the corn and bacon and hay he bought, he might have freed himself in a short time from the toils of the credit system. Little wonder that intelligent men campaigned earnestly for diversification.... Those farmers who raised foodstuffs were generally in better condition financially than those who did not, but in spite of their example the hold of cotton upon the ordinary southern farmer remained unbroken...[15].

Hicks depicts the operation of the credit system and the exploitation of farmers by merchants in classical terms:

> The effect of the crop liens [the main instrument of the credit system] was to establish a condition of peonage throughout the cotton South. The farmer who gave a lien on his crop delivered himself over to the tender mercies of the merchant who held the mortgage. He must submit to the closest scrutiny of all his purchases, and he might buy only what the merchant chose to sell him. He was permitted to trade with no other merchant except for cash, and in most cases his supply of cash was too meager to be worth mentioning. He must pay whatever prices the merchant chose to ask. He must market his crop through the merchant he owed until the entire debt was satisfied, and only then had he any right to determine the time and method of its disposal. If his crop failed to cancel his debt, as was the case with great regularity, he must remain for another year--perhaps indefinitely--in bondage to the same merchant, or else by removing to a new neighborhood and renting a new farm became a fugitive from the law. Estimates differ, but probably from three-fourths to nine-tenths of the farmers of the cotton South were ensnared to a greater or less degree by the crop-lien system.*
>
> The high prices charged by the merchants on credit accounts contributed immeasurably to the distress of the Southern farmer.... The fact that large margins of profit were realized from the credit trade is not open to question....
>
> . . . . . .
>
> The credit system contributed also to the one-crop evil, which did more than its full share to insure to the farmer a permanent condition of indebtedness. Cotton almost served the purpose of money, for it was always marketable, it was comparatively imperishable, it could not be consumed by the producer and thus destroyed, as could corn, for example, and it was comparatively easy to handle. The merchant, therefore, wished his customers to raise cotton, and he objected strenuously if they proposed to raise instead such articles as hay, corn, wheat, or potatoes. It was far more expedient, if not more profitable, for the farmer who found himself in need of credit to do what the merchant desired--plant nothing but cotton [16].

In this traditional view, merchant usury and the "one-crop evil" were the two major sources of economic hardship in the cotton South. Farmers clung to cotton both because of their own irrationality (planting more and more cotton as the price fell ever farther) and because they were forced to grow the staple by monopolistic merchants.

It would be possible to develop these themes further by examination of the historical literature, uncovering different points of emphasis and changes in nuance. More progress can be made, however, by posing a series of questions which embody the main points at issue:

(1) Was Southern agricultural labor exploited? Was labor paid (in the aggregate) a wage equal to the value of its marginal product?

(2) What were the relative productivities of white and black agricultural labor? If productivity differences did exist, were they attributable to human capital differences?

(3) Was cotton more or less productive and profitable than the alternative crops? Related to this question is the second one, that is, were Southern farmers irrational or constrained in their concentration on cotton?

(4) To what extent did the rural furnishing merchants exercise a monopoly in the credit market?

To each of these questions of fact, there corresponds a pair of essentially distinct historical hypotheses which have broader implications in interpretation of the economic and political history of the South during this period. Because the competing hypotheses imply different answers to the factual questions (1)-(4), empirical determination of the

answers to (1)-(4) would constitute a first critical test of the alternative descriptions of the historical reality. The hypotheses tested by answering (1)-(4) are the following:

(1A) The Exploitation Hypothesis. This is the economic interpretation of Southern social, legal and political history which holds that political and economic freedoms were denied the working population for the economic advantage of the landlord class. It identifies the various repressive laws and racial customs as the manifestations of legal and extra-legal exercise of market power by employers.

(1B) The Competition Hypothesis. This alternative describes the post-bellum labor market as relatively free of imperfections. Given the Competition Hypothesis, any explanation for the social tensions and racial discord of the post-bellum period must fit within the context of a normally functioning labor market.

(2A) The Legacy of Slavery Hypothesis. This consists of the notion that slavery deprived the blacks of the human capital required to achieve reasonable levels of productivity after emancipation. It predicts that blacks as a whole were less productive than whites as a whole. Given the establishment of the Competition Hypothesis, the Legacy of Slavery Hypothesis would provide an explanation of a wage and income differential between whites and blacks.

(2B) The Land Occupancy and Ownership Hypothesis. The alternative in this case attributes productivity differences associated with the different groups of farmers to differences in the quality characteristics of the land they farmed, and income differences to unequal non-human factor ownership.

(3A) The Overproduction Hypothesis. This hypothesis summarizes the suggestions that Southern cotton farmers clung to cultivation of their staple, either because of their own traditionalism or merchants' insistence on cotton, in the face of adverse price movements and despite the benefits which would have followed diversification.

(3B) The Rational Crop Choice Hypothesis. This alternative states that Southern farmers were rational in their concentration on cotton, because of the suitability of Southern soil and climate for cotton as opposed to the other agricultural possibilities. Cotton enjoyed a "comparative advantage" [17] in the South in the sense that in areas where it could be grown, it earned farmers higher returns than were obtained from comparable factor inputs in other areas of the South which grew alternative crops. In addition, farmers in general responded rationally to the fluctuations in relative price of cotton and the alternative crops.

(4A,B) The obvious alternatives are that furnishing merchants either were or were not monopolists in the rural credit market. However, factual question (4) cannot be answered here, due to limitations in the investigator's resources and the paucity of data on Southern country stores. The issue of exploitation by merchants will be discussed in the context of question (3), but it cannot be settled with the same confidence as the other questions at this time.

Of course, these are not the only hypotheses which can be proposed concerning the structure of Southern agriculture. Nevertheless, they are in the spirit of both the contemporary accounts and the historical

literature. In addition, the hypotheses seem to be reasonable a priori--none of them has the attributes of the implausible "straw man." Even when the hypotheses are mutually exclusive in the particular (e.g., a farmer cannot be both exploited and paid a competitive market wage), examples of each might well be found to coexist side by side. Furthermore, black/white productivity differences could have resulted from both human capital differences and land quality differences. For these reasons, the determination of the answers to question (1)-(3) will focus on the aggregate situation. The settlement of questions (1)-(3) in the aggregate will be sufficient to reject some of the hypothesized descriptions of the 19th century Southern economy, and will provide a starting point for further investigation of the remaining hypotheses.

B. Results and Conclusions

The main findings of this study can be summarized as a series of established propositions.

(a) The narrative, anecdotal, non-quantitative historical sources are insufficient to establish or disprove the hypotheses of post-bellum Southern economic history proposed here. Convincing documentation can be found for both sides of factual questions (1)-(3)--whether the labor market was imperfect or competitive, whether Southern farmers were rational or irrational in concentrating on cotton, and whether black labor suffered from a lower level of skill and productivity than whites. This negative conclusion is partly of a methodological nature. Non-quantitative tests simply do not have the power to resolve historical reality in enough detail to test the hypotheses at issue.

(b) Nevertheless, more powerful statistical tests can be developed, based on estimation of agricultural production and supply functions for the post-bellum period. It is possible to show that different ranges of parameter values in properly specified agricultural production and supply functions correspond to the different possibilities inherent in (1)-(3).

(c) There is no evidence for over-all aggregate exploitation of agricultural labor. Production function estimates indicate that marginal product factor pricing is entirely consistent with the known levels of wage and sharecrop payments. If anything, labor tended to receive a wage somewhat higher than the value of its marginal product. In addition, the agricultural production functions were, for all practical purposes, constant returns to scale.

(d) Race-associated productivity differences did exist. Whites were not more productive as a group than blacks in all states, however. In one specification of the production function, blacks in the cotton belt states appeared to be less productive than whites, while blacks in the border and peripheral states were more productive than whites in these states. In a more generalized specification which allows productivity differences within each racial group according to the crop grown, white cotton farmers were the most productive everywhere, followed by black cotton farmers, black non-cotton farmers, and white non-cotton farmers in that order, with the black and white non-cotton farmers roughly equal in productivity at the bottom of the scale.

(e) Whatever the specification of the production function, cotton culture was more productive in value terms than the alternatives, other factors being equal.

(f) Regarding conclusions (d) and (e), it is impossible to identify whether the productivity differences associated with crop and race were due to human capital differences or to differences in the quality of land farmed by the different groups of farmers. The productivity results do, however, contradict the simple Legacy of Slavery notion that blacks as a whole were less productive than whites as a whole. All the results are consistent with either the Land Occupancy and Ownership Hypothesis or with a more complicated human capital explanation which allows for differentiation of skill levels within each racial group.

(g) Southern cotton farmers were about as price-responsive in the short run as Western wheat farmers, and their speed of adjustment to changes in relative prices of the alternative crops was such that relatively full adjustment to once-and-for-all price changes would have been completed in only a few years' time. In addition, most of the Southern states showed a positive trend in share of planted acres devoted to cotton, as well as a low long-run price elasticity of cotton supply consistent with a comparative advantage for cotton.

(h) The data and results are insufficient to settle the question of exploitation of farmers by merchants.

These results have broader implications for the interpretation of post-bellum Southern history. First, competition in the labor market cannot be rejected. Nothing in the results indicates any departure from marginal product factor pricing, at least after 1880. Sharecroppers received a fair market wage. The various repressive laws and acts of violence perpetrated against blacks were indeed widespread, but were not instruments of economic exploitation in the labor market.

The main source of income inequality and relative poverty was the same as in any ordinary capitalist market economy, that is, in the unequal distribution of ownership of the non-human factors of production. Some productivity differences may have been due to human capital disparities, but these differences were small compared to the returns from ownership of land and capital. Income and standard of living depended more on an agriculturalist's non-human factor endowment than on anything else.

The notorious pecularities of Southern agriculture, the sharecrop tenure system and discrimination against blacks, appear to have been relatively unimportant economically. The sharecropping institution had little or no impact upon either the distributional shares of labor, land and capital, or on the patterns of resource allocation. While it is true that blacks and whites differed in total productivity, these differences can be explained by the Land Occupancy and Ownership Hypothesis, with the productivities of the different groups depending on their location on different qualities of land. Even if some of the productivity differences were the result of different amounts of human capital possessed by whites and blacks, there is still no evidence of any deviation from marginal product factor pricing.

Both the production function and supply function estimates indicate that Southern farmers were almost certainly rational in their concentration on cotton. Cotton culture was associated with an unmistakable advantage in output as compared to the alternative uses of land. Cotton farmers were as elastic in their responses to relative price changes as wheat farmers of the West, and were neither slow nor irrational in responding to market price signals.

It is reasonable to assume that the slave "wage" was lower than the value of the marginal product of labor. Given the exploitation of slave labor, the transition to competitive market wage rates by 1880 meant that emancipation had concrete economic benefits for blacks. The social and political advancements of freedom were also great, despite setbacks

in the realization of full civil rights by all strata of the black population. Still, the defeat of the various land reform proposals made at the close of the Civil War was important in allowing a continued unequal distribution of wealth and income in the South, and this persistent inequality impeded the movement of both blacks and poor whites toward full social and political equality.

NOTES TO CHAPTER I

[1] Evsey Domar, "The Causes of Slavery or Serfdom: A Hypothesis," Journal of Economic History, XXX, No. 1 (March, 1970).

[2] Ibid., 20.

[3] Ibid., 23-30, for Domar's discussion of the United States case, as well as other historical instances suggestive of this hypothesis.

[4] Of course, one of the problems with Domar's hypothesis applied to the United States is that it does not explain why slavery was not established in the North, and particularly in the West. Even if the West were thought to typify the independent freeholder case (and it hardly can, since tenancy was widespread), the Domar hypothesis does not explain why one or the other of his polar cases emerges as the "equilibrium" for a particular region.

[5] For a brief general history of the Reconstruction period and of the "restoration" of the Southern planter class, see Kenneth Stampp, The Era of Reconstruction: 1865-1877 (New York: Vintage Books, a Division of Random House, 1965. First Vintage Books Edition, September, 1967).

[6] Domar cites several antecedents, among then V. Kliuchevsky, Kurs russkoi istorii (Moscow: Gosudarstvennoe sotsial'no-ekonomicheskoe isdatel'stvo, 1937; originally published in 1906), English translation by C.J. Hogarth, A History of Russia (New York: Russell and Russell, 1960); Herman J. Niebor, Slavery as an Industrial System: Ethnological Researches (The Hague: Martinus Nijhoff). According to Domar, Niebor refers to A. Loria, Les Bases Economiques de la Constitution Sociale (1893), and to E.G. Wakefield's A View of the Art of Colonization (1834). Domar also finds "glimpses" of the hypothesis in Adam Smith's The Wealth of Nations.

[7] S.W. Trotti, "Immigration," Southern Cultivator, XXVII (Dec. 1869), 372.

[8] Clarence Danhof, "Farm-Making Costs and the 'Safety-Valve': 1855-1860," in The Public Lands, ed. Vernon Carstensen (Madison: University of Wisconsin Press, 1963). Danhof's article reprinted with permission from the Journal of Political Economy, Vol. 49 (1941), 317-359.

[9] John Hope Franklin, From Slavery to Freedom (Second Edition, Enlarged: New York: Alfred A. Knopf, 1956), 308.

[10] W.E.B. DuBois, Black Reconstruction in America (New York: Atheneum [1935], 1969), 586.

[11] Paul S. Taylor, "Slave to Freedman," Working Paper VII of the Southern Economic History Project (Berkeley: Institute of Business and Economic Research, 1970), 33,35.

[12] The proper name for the Afro-American population is a sensitive matter. Most of the apellations used by 19th century authors have racist overtones today. And the designations preferred by the Afro-Americans themselves have varied over time and across class and regional lines. What seems to be the simplest contemporary usage will be followed in the text, referring to members of the two races with the symmetrical "black" and "white," although occasionally blacks will be referred to as "Negroes," since this term is still acceptable in scholarly usage. Also, the ex-slaves will sometimes be referred to as "freedmen," a term which has disappeared from the vernacular, hence has no overtones at all. Of course, 19th century sources will be quoted in their own language.

[13] Stampp, Era of Reconstruction..., 16, 120-1.

[14] Richard A. Easterlin, "Regional Income Trends, 1840-1950," in The Reinterpretation of American Economic History, eds. Robert William Fogel and Stanley L. Engerman (New York: Harper & Row, 1971), 38-49.

[15] John D. Hicks, The Populist Revolt (n.p.: Bison Books, University Nebraska Press, 1961; originally published by University of Minnesota Press, 1931), 48-9.

[16] Ibid., 43-6. Hicks' references for the first paragraph (footnoted at the asterisk) are to Matthew B. Hammond, The Cotton Industry: An Essay in American Economic History (Ithaca, New York: 1897); Matthew B. Hammond in the Political Science Quarterly, XII, 462; Alex M. Arnett, The Populist Movement in Georgia (New York: 1922, doctoral dissertation), 57-8; and Charles H. Otken, The Ills of the South; or Related Causes Hostile to the General Prosperity of the Southern People (New York: 1894) 76-8.

[17] "Comparative advantage" will be used here and throughout in a slightly different way than in standard international trade terminology. In trade discussions, the theory of comparative advantage explains why different countries or regions trading with each other tend to specialize in different lines of production. Here, "comparative advantage" refers to the particular advantages of cotton culture within a given region--the South. The term conveys the idea, common to both usages, of local conditions making specialization advantageous.

II. THE HISTORICAL EVIDENCE

The first step in testing the hypotheses of the previous chapter is to determine what support for them can be found in the reports and accounts of Southern agricultural practices of the nineteenth century. It will be shown in this chapter that a strong case can be built on either side of the main questions. These questions will be taken up one at a time, with the mass of narrative and anecdotal sources summarized in as coherent a manner as possible. Since the objective is simply to show the breadth of evidence that can be mustered for each of the opposing arguments, no systematic appraisal of the relative reliability of the sources will be attempted. In many instances, the same source contains points in favor of both sides of the questions, and these contradictions will be pointed out from time to time in the body of the chapter.

A. Exploitation in the Labor Market

Examination of the historical literature leaves no doubt that after the Civil War the Southern labor market was either characterized by widespread imperfection, or that segments of the planter population exerted great effort to acquire market power. Before considering the equally convincing documentation of competition in the labor market, the entire case for exploitation will be presented, point by point.

Southern observers did not frequently announce their exploitation of agricultural labor in modern terminology, so it is necessary to decide exactly what kinds of evidence can be taken as indications of

labor market imperfection. The following list is not exhaustive, but should serve as a useful guide:

(1) Evidence of legal limitations placed on labor mobility, or on the ability of laborers to seek out employment at the highest offered wage.

(2) Other evidence of limitations on labor mobility or bargaining rights, in the form of intimidation, laws, and ad hoc punishments for labor organizing or bargaining activity.

(3) Direct and indirect evidence of planters' collusion to depress the wages of workers.

(4) Evidence of a consciousness on the part of either employers or workers of exploitative labor relations.

(5) Legal or informal attempts to eliminate or restrict institutions, such as labor agencies, which would increase the flow of job information and smooth the operation of the labor market.

(6) Use of forced labor in various forms such as convict labor, illegal slave labor camps, or similar types of involuntary servitude.

(7) Evidence of the closure or restriction of occupations outside agriculture to sections of the farm labor force, particularly blacks.

(8) Attempts by planters to bend the Freedmen's Bureau and other relief agencies into becoming organs for the enforcement of exploitative contracts.

Each of these manifestations of actual or potential employer monopoly in the labor market can be found in the latter half of the

nineteenth century. Some appeared occasionally or infrequently, while others were almost constantly present.

The blacks were particular targets of real or intended exploitation. After the surrender of the Confederate armies, a series of interim state governments was set up according to the reconstruction plans of President Andrew Johnson [1]. Among the first acts of those governments was to pass a series of laws known collectively as the "Black Codes" [2]. These laws were designed to regulate race relations, in particular black labor and contracts. In addition to the more notorious provisions of these codes limiting black civil rights, prohibiting intermarriage, and regulating other social relations between the races [3], many of the codes contained severe infringements of the freedom of black labor. It is worthwhile to cite these codes at some length, because many of the restrictive devices introduced in them were to reappear in various forms throughout the post-bellum period.

Mississippi extended its statutory definition of vagrants to include "all freedmen, free negroes, and mulattoes in this State, over the age of eighteen years, found on the second Monday in January, 1866, or thereafter, with no lawful employment or business..." and subjected such "vagrants" to a fine of fifty dollars and imprisonment for not more than ten days. If the "vagrant" was unable to pay the fine, he could be hired out to any person who would pay it, with the amount of the fine deductible from the freedman's wages. Thus, Mississippi

blacks were denied the option of being unemployed at any time. Mississippi also levied a yearly $1 capitation tax on every freedman, non-payment of which was prima facie evidence of vagrancy [4].

Georgia also defined as vagrants those who "are able to work and do not work," and gave the courts the power to sentence such vagrants to be "bound out to some person for a time not longer than one year" upon posting of a bond not exceeding $300 (or less, at the court's discretion)[5]. South Carolina required any "person of color" who was engaged in any type of work other than farm labor to obtain a licence from the district judge and pay a fee ranging from $10 to $100 per year [6]. Florida also levied a head tax on all male inhabitants between 21 and 55 years old, with the usual punishment of hiring-out to follow on conviction of non-payment [7].

Hiring out of convicts was a recurring motif, and the definition of unemployed Negroes as criminals was not the only attempt by the defeated States to regulate the labor market through the criminal code. Violation of labor contracts was widely defined as a criminal offense. The Florida vagrancy law of 1866 provided that

> ...when any person of color shall enter into a contract as aforesaid, to serve as a laborer for a year, or any other specified term, on any farm or plantation in this State, if he shall refuse or neglect to perform the stipulations of his contract by wilful disobedience of orders, wanton impudence or disrespect to his employer, or his authorized agent, failure or refusal to perform the work assigned to him, idleness, or abandonment of the premises or the employment of the party with whom the contract was made, he or she shall be liable, ...to be arrested and tried before the criminal court of the county, and upon conviction shall be subject to all the pains and penalties prescribed for the punishment of vagrancy: Provided, That it shall be optional with the employer to require

> that such laborer be remanded to his service, instead of being subjected to the punishment aforesaid...[8].

Mississippi added that any person could earn a fee of $5 plus 10¢ a mile for arresting and returning a freedman, free Negro, or mulatto who quit his lawful employer before the expiration of his contract, the fee to be deducted, as usual, from the freedman's wages [9]. Louisiana restrained a laborer from "...leaving his place of employment until the fulfillment of his contract, unless by consent of his employer, or on account of harsh treatment, or breach of contract on the part of the employer; and if they do so leave, without cause or permission, they shall forfeit all wages earned to the time of abandonment" [10].

The regulation of labor extended beyond the enforcement of contracts with criminal procedures. The South Carolina Black Code included the humiliating provision that "All persons of color who make contracts for service or labor shall be known as servants, and those with whom they contract as masters" [11]. North Carolina in 1866 amended its apprentice law to apply to blacks in general, giving former masters the option of administering the "apprenticeship." Runaway apprentices could then be arrested for "desertion" and returned to their master or mistress [12]. South Carolina allowed the district judges to usurp the role of parents by providing that

> Colored children between 18 and 21, who have neither father nor mother <u>living in the district in which they are found</u>, or whose parents are paupers, or unable to afford them a comfortable maintenance, <u>or whose parents are not teaching them habits of industry and honesty</u>, or are persons of notoriously bad character, or are vagrants, or have been convicted of infamous offenses, and colored children, <u>in all</u>

> cases where they are in danger of moral contamination, may be bound as apprentices by the district judge or one of the magistrates for the aforesaid term [13].

Mississippi also gave the courts broad powers to apprentice out black children, with preference given to former owners [14].

The regulation of labor extended in some cases to a detailed specification of exactly what behavior was required and prohibited on the job. Louisiana in 1865 legislated that, "when in health, the laborer shall work ten hours during the day in summer, and nine hours during the day in winter, unless otherwise stipulated in the labor contract"; and that "Bad work shall not be allowed." Injuries to farm animals were to be deducted from wages, the laborers were not allowed to leave home without permission of the employer, and "disobedience, impudence, swearing, or indecent language to or in the presence of the employer, his family or agent" were prohibited. Laborers were not to receive visitors during work hours, and they were to be allowed to keep no livestock without the permission of the employer [15].

The Black Codes' regulation of the labor market was not confined to provisions applying only to freedmen. Also common in these codes were the "anti-enticement" provisions which made it a crime for landlords to compete for labor in the marketplace. Mississippi provided that

> ...if any person entice away any apprentice from his or her master or mistress, or shall knowingly employ an apprentice, or furnish him or her food or clothing, without the written consent of his or her master or mistress, or shall sell or give said apprentice ardent spirits without such consent, said person so offending shall be guilty of a high misdemeanor, and shall on conviction thereof before the county

> court, be punished as provided for the punishment of persons enticing from their employer hired freedmen, free negroes, or mulattoes [Emphasis added] [16].

Georgia similarly provided that it was a criminal offense "for any person to interfere with, hire, employ, or entice away, or induce to leave the service of another, any laborer or servant," as well as specifying that any laborer who left his employer without "justifiable excuse" should be guilty of a misdemeanor. The discovery of a person in another man's employ before expiration of a legal contract was taken as prima facie evidence of violation of the anti-enticement law by the new employer, and interestingly enough, the provisions of this act do not seem to have been restricted to employment of blacks by whites, but included all "laborers or servants" [17]. Florida went even further in the severity of its anti-enticement law, providing that

> ...if any person shall entice, induce, or otherwise persuade any laborer or employee to quit the service of another to which he was bound by contract, before the expiration of the term of service stipulated in said contract, he shall be guilty of a misdemeanor, and upon conviction shall be fined in a sum not exceeding one thousand dollars, or shall stand in the pillory not more than three hours, or be whipped not more than thirty-nine stripes on the bare back, at the discretion of the jury [18].

Considering this law in conjunction with the Florida vagrancy law, which defined unemployment as vagrancy and empowered the courts to bind out convicted vagrants for one year, the net effect was an attempt to legislate the labor market out of existence. This was one instance in which the freedmen and whites received equal treatment under the Black Codes--convicted vagrants could also be punished by whipping and the

pillory, though the limits of these tortures are not specified in the case of the freedmen [19].

The Black Codes were short-lived, and were overturned either by the federal military authorities or when the Johnson Reconstruction governments were swept away by Congress in 1867 [20]. Still, the codes indicate at the very least the determination of the leading Southern elements to retain control of the black labor force in the face of emancipation. It is also interesting that the messages of several of the federal military governors striking down the Black Codes contain explicitly anti-monopoly language. Major General A.H. Terry's order commanding the non-enforcement of the Virginia Vagrant Act is worth quoting at length. General Terry first summarized the provisions of the Act, which were entirely similar to the Vagrancy Acts cited above. He then concluded:

> Among those declared to be vagrants are all persons who, not having the werewith to support their families, live idly and without employment, and refuse to work for the usual and common wages given to other laborers in the like work in the place where they are.
>
> In many counties of this State meetings of employers have been held and unjust and wrongful combinations have been entered into for the purpose of depressing the wages of the freedmen before the real value of their labor, far below the prices formerly paid to masters for labor performed by their slaves. By reason of these combinations wages utterly inadequate to the support of themselves and families have, in many places, become the usual and common wages of the freedmen. The effect of the statute in question will be, therefore, to compel the freedmen, under penalty of punishment as criminals, to accept and labor for the wages established by these combinations of employers. It places them wholly in the power of their employers, and it is easy to forsee that, even where no such combination now exists, the temptation to form them offered by the statute will be too strong to be resisted, and that such inadequate wages

> will become the common and usual wages throughout the State. The ultimate effect of the statute will be to reduce the freedment to a condition of servitude worse than that from which they have been emancipated--a condition which will be slavery in all but its name.
>
> It is therefore ordered that no magistrate, civil officer or other person shall in any way or manner apply or attempt to apply the provisions of said statute to any colored person in this department.
>
> By command of Major General A.H. Terry, [21]
> Ed. W. Smith, Assistant Adjutant General.

Hardly a clearer perception of the efforts of the defeated Southern planters to maintain their monopoly control over labor could be found. Nor is General Terry's message the only example of the recognition by the Union authorities of the intent of the Black Codes. General Sickles, in disallowing the South Carolina Code, forbade the levy of any tax or fee for a licence for the practice of lawful trades, and stated that "no person will be restrained from seeking employment when not bound by voluntary agreement, nor hindered from traveling from place to place, on lawful business. All combinations or agreements which are intended to hinder, or may so operate as to hinder, in any way, the employment of labor--or to limit compensation for labor--or to compel labor to be involuntarily performed in certain places or for certain persons; as well as all combinations or agreements to prevent the sale or hire of lands or tenements, are declared to be misdemeanors..." [22].

Southern employers' efforts to exploit the emancipated blacks immediately following the war were not confined to passage of the Black Codes alone. There is some evidence of an attempt on the part of Southern opinion to influence the Freedmen's Bureau into becoming the

agency for the enforcement of stringent and restrictive contracts on black labor. George Ruble Woolfolk uncovered a correspondence between William King, a Georgia planter, and Oliver O. Howard, Director of the Freedmen's Bureau, concerning ways in which the Freedmen's Bureau might make Negro labor more serviceable. According to Woolfolk, "King represented a group of planters who had met at Savannah for the purpose of effecting plans to solve the labor problem, and had written General Howard about it" [23]. King recommended for "All freedmen who have not permanent supporting employment, in cities, towns, and villages, to be required to remove to the country and make engagements for their labor," and that "All capable labor shall at once make engagements to labor in the country or agriculture, or otherwise for a term not less than 12 months from the date of contract at such wages as both parties may agree upon" [24]. In King's plan, the Freedmen's Bureau was to avoid issuing rations to any freedman who was capable of working, and in the event that a freedman broke his contract, the response of the Bureau was to be severe:

> Any Freedmen who shall abandon in place of labor or fail to perform properly and faithfully the duties he has contracted to perform, or for other bad conduct, shall be reported to the nearest local superintendent, who shall immediately institute an examination of the case reported, and decide on its merits, and should such superintendent determine and decide, that the Freedman has been guilty of improper or unfaithful conduct, such Freedman shall be immediately placed in solitary confinement (and supplied only with bread and water) for such length of time as may be determined on, not however to exceed the term of his contract, and during the period of such absence from labor his wages shall cease and he shall yet be chargeable with the expense of supporting the non-supporting members of his family" [25].

Solitary confinement on bread and water was also the penalty recommended by King for freedmen who had neglected or refused to make a contract for a year's labor before the first of January of each year. In addition to enforcing the making and maintenance of labor contracts, the Freedmen's Bureau was admonished to punish any freedman who trespassed on the property of others, or who made visits to farms or plantations other than the one where he was employed, without permission of his employer [26]. Needless to say, these recommendations were ignored, at least in the official policy of the Bureau. Nevertheless, such sentiments undoubtedly reflected a substantial segment of planter opinion, and there were instances of local Freedmen's Bureau officials' carrying out this sort of policy. For example, Brigadier General Fullerton, upon assuming control of the affairs of the Freedmen's Bureau in New Orleans immediately after the war, issued an order "that all persons of color in and about the city of New Orleans who did not produce evidence immediately of being employed should be arrested as vagrants. The consequence was that in the course of twenty-four or forty-eight hours a very large number of colored persons who were found upon the streets without evidence of employment with them were put in prison." General Fullerton's order was revoked within 48 hours by General Canby, commander of the district, but the incident was probably repeated in other cases [27]. One historian even found that

> Employers sometimes took advantage of the credulity of the Negroes to cheat them, or to offer better working conditions and induce them to break their contracts with another employer in order to take advantage of higher wages. Indeed, so common

> was this latter practice that the Freedmen's Bureau provided that planters should be fined from $100 to $500 for the offense [28].

It is difficult to know whether the "offense" referred to was fraud or competition by an employer for labor.

Reference to the Exploitation Hypothesis helps to explain the often-repeated complaint of Southern planters that they faced a "labor shortage." This cry was most often raised in the years just following the end of the war. A letter from a frustrated Mississippi planter to The Southern Cultivator, one of the most important agricultural magazines of the post-war period, is typical: "Labor is wanting; none of the plantations in this vicinity are fully stocked with hands" [29]. DeBow's Review attributed the decline in the size of the plantation labor force to three causes:

> ...we fear...that labor in cotton culture is fast diminishing. It is from three causes: Emigration from the cotton fields to the towns and cities; the deaths on the plantations; and, the retiring of women from cotton growing [30].

This same article estimated the loss by death in the black population during the Civil War as between 500,000 and 1,000,000 persons [31]. But planters' compaints of a "scarcity of labor" implied in the simplest sense that they wished to employ more labor than was forthcoming at the offered wage. This is consistent with the offered wage's being below the market-clearing equilibrium wage, because of planters' obstinate refusal to increase the offered wage. Instead, they attempted to force the blacks to work under compulsion, and found a "shortage" of labor.

It should be pointed out that an offered wage below the market wage in the years immediately following the war is also consistent with a slow planter adjustment from paying slave wages to paying competitive wages, in the face of a temporary labor market disequilibrium following emancipation. There is some evidence that the wage increased just after the war ended, and this will be discussed subsequently as part of the conflicting evidence that the labor market was operating competitively.

The belief that the blacks would not work without compulsion and the disposition of the planters to exploit them were linked. Carl Schurz's Report on his fact-finding mission through the defeated Confederacy contained both direct and indirect evidence of this. Schurz himself drew the gloomy conclusion that "In at least nineteen cases of twenty the reply I received to my inquiry about their [southern whites'] view of the new system [of free labor] was uniformly this: 'You cannot make the negro work without physical compulsion.' I heard this hundreds of times, heard it wherever I went, heard it in nearly the same words from so many different persons, that at last I came to the conclusion that this is the prevailing sentiment among the southern people." Schurz continued:

> A belief, conviction, or prejudice, or whatever you may call it, so widely spread andapparently so deeply rooted as this, that the negro will not work without physical compulsion, is certainly calculated to have a very serious influence upon the conduct of the people entertaining it. It naturally produced a desire to preserve slavery in its original form as much and as long as possible--and you may, perhaps, remember the admission made by one of the provisional governors, over two months after the close of the war, that the people of his State still

> indulged in a lingering hope slavery might yet be preserved--or to introduce into the new system that element of physical compulsion which would make the negro work. Efforts were, indeed, made to hold the negro in his old state of subjection, especially in such localities where our military forces had not yet penetrated, or where the country was not garrisoned in detail. Here and there planters succeeded for a limited period to keep their former slaves in ignorance, or at least doubt, about their new rights; but the main agency employed for that purpose was force and intimidation. In many instances negroes who walked away from the plantations, or were found upon the roads, were shot or otherwise severely punished, which was calculated to produce the impression among those remaining with their masters that an attempt to escape from slavery would result in certain destruction [32].

Schurz then summarized the accounts which were sent to him of exploitative practices. Typical of these reports are those of Captain W.A. Poillon, Assistant Superintendent of the Freedmen's Bureau in Mobile. In a letter dated July 29, 1865, Poillon listed some of the murders, mutilations, and other acts of violence perpetrated against Negroes who left the plantations of their former masters in his district, and concluded

> ...Murder with his ghastly train stalks abroad at noonday and revels in undisputed carnage, while the bewildered and terrified freedmen know not what to do. To leave is death; to remain is to suffer the increased burden imposed on them by the cruel taskmaster, whose only interest is their labor wrung from them by every device an inhuman ingenuity can devise. Hence the lash and murder are resorted to to intimidate those whom fear of an awful death alone causes to remain, while patrols, negro dogs, and spies (disguised as Yankees) keep constant guard over these unfortunate people [33].

In another letter, Capt. Poillon reported that "laborers on the plantations are forced to remain and toil without hope of remuneration" [34]. Schurz's documents leave the distinct impression that white employers recognized no limitation on the level of violence exercised to prevent free travel and free labor contracting by blacks during the years immediately following the conclusion of the war.

Schurz referred to a series of "attempted municipal regulations" in Louisiana which had all the attributes of the state-wide Black Codes, regulations "to prevent the freedmen from obtaining employment [away] from their former masters" and "applying exclusively to the negro, and depriving him of all liberty of locomotion..."

> The negro is not only not permitted to be idle, but he is positively prohibited from working or carrying on a business for himself; he is compelled to be in the "regular service" of a white man, and if he has no employer he is compelled to find one. It requires only a simple understanding among the employers, and the negro is just as much bound to his employer "for better and for worse" as he was when slavery existed in the old form. If he should attempt to leave his employer on account of non-payment of wages or bad treatment he is compelled to find another one; and if no other will take him he will be compelled to return to him from whom he wanted to escape. The employers, under such circumstances, are naturally at liberty to arrange the matter of compensation according to their tastes, for the negro will be compelled to be in the regular service of an employer, whether he receives wages or not [35].

Schurz was pessimistic about the willingness of the white South to accede to the full emancipation of Negro labor. His conclusion in this regard may be taken as an original statement of the Exploitation Hypothesis:

> As long as a majority of the southern people believe that "the negro will not work without physical compulsion," and that "the blacks at large belong to the whites at large," that belief will tend to produce a system of coercion, the enforcement of which will be aided by the hostile feeling against the negro now prevailing among the whites, and by the general spirit of violence which in the south was fostered by the influence slavery exercised upon the popular character. It is, indeed, not probable that a general attempt will be made to restore slavery in its old form, on account of the barriers which such an attempt would find in its way; but there are systems intermediate between slavery as it formerly existed in the south, and free labor as it exists in the north, but more nearly related to the former than to the latter, the introduction of which will be attempted [36].

Schurz included in his Report documentation of attempts by planters to restrain competition among themselves for black labor as well. A list of suggestions submitted to Schurz by a committee of planters on November 24, 1864 recommended "A law to punish most severely any one who endeavors, by offering higher wages, gifts, perquisites, &c., &c., to induce a negro to leave his employer before the expiration of the term for which he has engaged to labor without the consent of said employer" [37]. A letter from T. Gibson of the N.O. and O. Railroad dated December 1, 1864, urged Schurz that "Wages, rules, and regulations should be fixed and uniform; nothing left to discretion. A penalty should be inflicted on every employer who deviates from the established rates, maximum rates....Wages should be extremely moderate on account of the unsteadiness of labor and exceeding uncertainty of crops of all sorts, but especially of cane and cotton" [38].

Needless to say, these overt and unsubtle efforts on the part of the defeated South to re-subjugate the black population did not meet with favor among the abolitionist, radical, and even moderate Unionist population of the North. The Black Codes were nullified, the provisional State governments dissolved, and the progress of Reconstruction was taken over by the Congress. In preparation for this, Congress established in 1865 the Joint Committee on Reconstruction, composed of members of both Houses "who shall inquire into the condition of the States which formed the so-called Confederate States of America, and report whether they, or any of them, are entitled to be represented in either house of Congress..." [39]. This Joint Committee included

prominent Radical Republications, among them Thaddeus Stevens, but it was actually controlled by the moderates [40]. Testimony before it supports in some places the Exploitation Hypothesis, in others the Competition Hypothesis. The evidence for competition will be presented later, in keeping with the organization of the material in this chapter.

The Joint Committee on Reconstruction, like Schurz, found abundant grounds for believing that large segments of Southern opinion favored re-establishment of some kind of slavery. Richard Hill, an ex-slave living in Hampton, Va., testified that "...it seems to be a prevalent idea, that if their [the Southern states'] representatives were received in Congress the condition of the freedmen would be very little better than that of the slaves, and that their old laws would still exist by which they would reduce them to something like bondage. That has been expressed by a great many of them" [41]. This opinion was shared by Major General George H. Thomas, commander of the military division of Tennessee, who said that "...if all restraint should be removed, the freedmen would be thrown back into a condition of virtual slavery; that is, they would be compelled by legislative enactments to labor for little or no wages, and the legislation would assume such a form that they would not dare to leave their employers for fear of punishment" [42]. Nor were such opinions confined to pro-abolition spokesmen. Major General Clinton B. Fisk, a Mississippi Freedmen's Bureau Official, related that he had attempted to obtain the release to her mother of a little girl being held by a Mississippi planter. General Fisk entered

into the record of his testimony the close of the letter he received in reply from the planter:

> As to recognizing the rights of freedmen to their children, I will say there is not one man or woman in all the south who believes they are free, but we consider them as stolen property--stolen by the bayonets of the damnable United States government.
>
> Yours truly,
> T. Yancey.

General Fisk characterized the Yancey letter thus: "That is a sample of very much of the correspondence we have with that class of people" [43]. The theme that the freedmen would not work without compulsion was also reiterated by several witnesses before the Joint Committee [44].

The Committee uncovered many "outrages" committed against the free black population in attempts to regulate the labor market. Madison Newby, a black resident of Surrey county, Va., testified to a bizarre perversion of wage bargaining:

> ...In Surrey county they [the employers] are taking the colored people and tying them up by the thumbs if they do not agree to work for six dollars a month; they tie them up until they agree to work for that price, and then they make them put their mark to a contract.

QUESTION. Did you ever see a case of that kind?

ANSWER. Yes, sir, I did.

QUESTION. How many cases of that kind have you ever seen?

ANSWER. Only one; I have heard of several such, but I have only seen one.

QUESTION. What is the mode of tying up by the thumbs?

ANSWER. They have a string tied around the thumbs just strong enough to hold a man's weight, so that his toes just touch the ground; and they keep the man in that position until he agrees to do what they say. A man cannot endure it long.

QUESTION. What other bad treatment do they practice on the blacks? Do they whip them?

ANSWER. Yes, sir; just as they did before the war; I see no difference...[45].

Captain J.H. Matthews, a provost marshal or sub-commissioner of the Freedmen's Bureau in Mississippi, reported that in "ninety-nine cases out of a hundred" the freedmen were driven from the plantations at the end of the year without payment for their work, and that the old system was flogging was practiced extensively: "Inhuman flogging, to the extent, in some cases, of 350 lashes" [46]. Major General David S. Stanley remembered "four or five instances where negroes were killed for trying to leave their masters" in the state of Texas [47].

The Joint Committee on Reconstruction also found direct evidence of planters' collusion to maintain low wage levels. Major General Clinton B. Fisk, the Alabama Freedmen's Bureau official quoted previously, contributed this account of wage-fixing,under questioning by Representative Boutwell of Massachusetts:

QUESTION. Do you know of any combinations among employers for the purpose of regulating the price of labor among the freedmen?

ANSWER. There were such combinations made early in the summer, among the planters in their conventions, fixing a very low rate of compensation for the labor of the freedmen. But the combinations were broken up by the officers of the Freedmen's Bureau. My orders prohibited any combinations of the people, or of communities, fixing any rate of wages. My directions to my subordinates were, to let labor, like any other commodity, compete in an open market [48].

Major General Thomas of Tennessee also reported that he had received rumors of such combinations of employers, and had warned the officers

of the Freedmen's Bureau to "take steps to prevent any undue advantage being taken by employers over the laborers they employ" [49]. The tension between the opposing forces--the employers striving for market advantages and the federal occupation armies acting to prevent it--is highlighted in these testimonies, with the ultimate resolution in doubt. It seems likely that the Union generals would claim success in their campaign against the "combinations" even if the planters had been able to sidestep all efforts to break them up. In any case, Major General Edward Hatch had little doubt that many of the planters' "combinations" formed to begin re-restablishing slavery had as their main objective the regulation of wages:

> The men there [in Tennessee] who dislike the present state of things do not like to give up the negro. They think that by some kind of legislation they can establish a kind of peonage, not absolute slavery, but that they can enact such laws as will enable them to manage the negro as they please--to fix the prices to be paid for his labor. That is a very general idea among that class of men. But those men of broad views who know that labor will find its level, are in favor of hiring the negro and paying him fairly. But they are in the minority [50].

Reports of planter collusion during the '60's were not confined to accounts and testimony of hostile Northerners. DeBow's Review, organ of the most respectable planter opinion, reported an 1868 meeting of citizens in Summerville, Alabama, which resolved, among other things:

> Whereas, The present disorganized and inefficient System of Labor is causing great loss to the citizens of this community and country, and must ultimately result in the entire destruction of the agricultural interests of the country; and whereas the interests of the whites and blacks are identical; therefore,

> 1st. Resolved, That concert of action is indispensable among those hiring laborers for the ensuing year.
>
> 2nd. That every one hiring laborers should impress upon them the necessity of complying with the terms of their contract; and in the event of their failure to do so, they should be discharged.
>
> 3rd. That as good citizens, and acting in good faith towards each other, we pledge ourselves not to employ any laborers discharged for a violation of contracts, without a certificate of recommendation from the person last employing them.
>
> . . . . . .
>
> 6th. That we should adopt a schedule of prices equalizing the wages paid laborers; and that we recommend the following classification: for 1st class field hands $10 per month; 2nd class $8 per month; 3rd Class $6 per month [51].
>
> . . . . . .

At about the same time, the planters in Amite County, Mississippi, recommended that if a freedman be discharged for poor work, or for attending "club meetings" without permission, the planters should "pledge ourselves not to hire or give such freedmen employment under any circumstances" [52].

All these quotations point unmistakably to a will on the part of the former Southern slave holders to interfere with the free operation of the labor market. The existence of the will does not imply that a way was found, however. The provision governments were dissolved, the Black Codes overturned, Republication reconstruction governments established throughout the defeated Confederacy with black participation, and the great Fourteenth and Fifteenth Amendments to the Constitution passed. The immediate post-war codes and combinations may have been futile efforts to maintain an advantage lost with abolition. But if so, the planters were persistent. The same sorts of oppressive laws and practices were tried over and over throughout the nineteenth century.

It would be impractical here to attempt to summarize the provisions of Southern legislation regarding agricultural labor relations for the period between the Civil War and World War I. Fortunately, other scholars have done this work, and their findings will be drawn on here. Oscar Zeichner, writing in the Political Science Quarterly in 1940, surveyed Southern laws regarding agricultural labor from the time of the Civil War through the thirties, and concluded that in addition to the crop lien laws, "...the laws dealing with labor contracts, false pretenses, emigrant agents, and the enticing of laborers have assured the planter of legal support in his effort to secure a stable labor supply during the agricultural year" [53]. It is interesting to see exactly how these laws guaranteed a "stable labor supply."

Several Southern states passed "false pretenses" laws "to keep agricultural laborers on the plantation for the duration of their contracts." The North Carolina law was typical:

> In North Carolina it is a criminal offense, punishable by fine or imprisonment, for anyone to obtain advances "with intent to cheat or defraud..." from a person or corporation, and then "willfully fail, without a lawful excuse, to commence to complete such work according to contract...."* It constituted a like violation in twenty-one counties of the state for a tenant or sharecropper to receive supplies from his landlord and then refuse to cultivate the crop or abandon it "without good cause and before paying for such advances."**

As of the dates indicated, Alabama (1928), Georgia (1933), and South Carolina (1932) had similar "false pretenses" laws on the books [54]. All the "false pretenses" laws were designed to make violation of labor contracts a criminal offense. The Mississippi Supreme Court in 1912 had struck down a Mississippi law which made it a crime for a laborer,

renter or sharecropper to break a written contract without securing the landlord's permission, and to make another contract without notifying the second employer of the existence of the first agreement [55], and the U.S. Supreme Court had overturned a similar Alabama law in 1911 [56]. Since the courts had declared it unconstitutional to make the mere breach of a labor contract a criminal offense, the "false pretenses" statutes were drawn up ostensibly to punish fraud [57].

The "false pretenses"laws were not the only echo of the Black Codes. Zeichner's description of the "anti-enticement" laws could scarcely be more graphic:

> Complementing the false pretense laws are those prohibiting the "enticing" of croppers, tenants and laborers from their employers. Farm hands might be kept on the plantation by threat of economic loss and legal punishment, but planters still had to eliminate the danger of outside interference with their tenants and croppers. The chief competitors for the cheap and tractable labor supply on the plantations were, first, the industrial enterprises of the North and to a lesser extent those of the South, and, secondly, farm operators, who because of labor shortages or other crises had to secure immediate extra help. In order to eliminate the danger from the first source, some states, notably Alabama, Georgia, Mississippi and South Carolina, have placed prohibitory restrictions upon employment agents who solicit and send labor out of the state. In Alabama all "emigrant agents", as they are usually called, and their assistants, partners and employees are required to pay an annual tax of $5,000 to the state. Each county of the state in which the agent operates can levy an additional tax up to a maximum of $2,500.* In Mississippi, labor agents must pay a fee of $500 for each county in which they work.** Georgia requires emigrant agents to post a bond acceptable to the Commissioner of Commerce and Labor "conditioned to pay any valid debt" owed by the solicited laborer to a citizen of the state. In addition they are taxed $1,000 for every county in which they carry on business.*** South Carolina also requires that emigrant agents be licensed by state and county. In both cases the licenses are renewable annually. The state fee is $500 for each county in which labor is solicited, while every county demands $2,000 for the similar privilege within its jurisdiction.**** Violations of these provisions

> in all of the above states are punishable by heavy fine or imprisonment [58].*****

In addition, as of the dates indicated, Alabama (1928), Arkansas (1937), Georgia (1933), Louisiana (1932), Mississippi (1930), certain counties of North Carolina (1935) and South Carolina (1932) forbade "the 'enticing' or employment of tenants, sharecroppers and laborers... already under contract, and whose period of work has not ended" [59].

The United States Congress in 1898 set up an Industrial Commission to "investigate questions pertaining to immigration, to labor, to agriculture, to manufacturing, and to business," [60] and its investigation revealed that Kentucky, Arkansas, South Carolina, Georgia, Tennessee, North Carolina, Mississippi, Florida, and Alabama all had anti-enticement statutes on the books at that time [61]. One witness before the Industrial Commission argued that North Carolina's "Landlord and Tenant Act," a law ostensibly designed to provide a "homestead exemption" of $1,000 worth of real estate and $500 worth of personal property "not liable to execution for debt on any judgement acquired," had the result of virtually enslaving tenants to landlords. The Landlord and Tenant Act preserved the "homestead exemption" by making non-payment of debts a criminal offense, and this law was apparently used by some landlords to prevent labor mobility:

> I believe that the homestead law in our section of the country is really a hindrance and trouble rather than a benefit to the poor man, whom it was intended to benefit. These technical violations of the criminal law, however, are not, as I should like to emphasize, invoked by the better element of our landlords. They are, as a rule, liberal; it is only by some shyster fellow who wants to stop me when I am disposed to go elesewhere with a view of bettering my condition. He finds

> that I have technically violated some of these laws. It is difficult for a man to live on premises for a time without violating any law--if not the spirit, some part of the letter. He uses that as a lever to hold them over, under a promise of immunity from prosecution in the courts.
> . . . . . .
> The law is in favor of the landlord, and, if need be, he can use it to the detriment of the tenant. That is the general trend of the law through North Carolina... [62].

Charles S. Mangum, Jr., in his 1940 monograph The Legal Status of the Negro, chronicled the see-saw balance between the Southern states' attempts to restrict the freedom of agricultural labor through various types of peonage laws, and the federal courts' overturning of those laws [63]. In a Florida case decided in 1905, the federal court found that if an employer charged a runaway debtor with a crime for the sole purpose of having the debtor released to his custody to work off his debt, the federal anti-peonage statutes were violated. Similarly,

> In a South Carolina case a federal court held that one is guilty of peonage who by reason of his superior economic and social position induces a party to labor for the purpose of paying debts by threats of prosecution under criminal statutes, if by reason of such threats the will of the party is overcome.* Again, it has been said that one is guilty of peonage if he falsely pretends to another that the latter is accused of a criminal offense and offers to prevent his conviction if he will pay the prosecutor a sum of money in satisfaction, thus inducing him to sign a labor contract to reimburse the one who is supposed to have paid such a sum for him and to submit to a deprivation of liberty in the meantime [64].**

It should be noted that all these cases (as well as certain others not cited here) were decided in the first decade of the 1900's, just at the close of the period under study here. Clearly, the peonage issue was the subject of much adjudication in the South around the turn of

the century, and where there is so much smoke, there is likely to be a substantial amount of fire. Mangum concluded that as late as 1940 "Situations exist...in the South as well as in other sections of the nation where Negroes are held in circumstances which approach involuntary servitude" [65]. In his judgment, at least, the outcome of the legal struggle over labor peonage was not entirely in favor of the blacks.

These laws were not simply dead letters, remaining on the books because no one bothered to repeal them. A.B. Hart was one of the most perceptive observers of the South in the late 19th century. In 1910 he wrote The Southern South, based on his correspondence with Southerners, conversations with his students at Harvard, and "...in the last twenty-five years...a dozen or more visits to various parts of the South ranging in length from a few days to four months,..." as well as a journey through rural parts of the South during the winter of 1907-8 [66]. Hart found ample evidence of practices completely consistent with the laws discussed previously. "Of recent years a new and rather a renewed cause of race hostility has been found, because the great demand for labor, chiefly in the cotton fields, gives rise to the startling abuse of a system of forced labor, commonly called peonage, which at the mildest is the practice of thrashing a hand who misbehaves on the plantation, and in its farthest extent is virtually slavery" [67]. Also, "the conditions of the old slavery times are more nearly reproduced in the cotton field than anywhere else in the South" [68]. Part of this peonage system was the expected collusion

among employers:

> It is unwritten law among some planters that nobody must give employment for the remainder of the year to a hand who is known to have left his crop on another plantation; and still further, that no contract should be made at the beginning of the year with a family which, after accounting for the previous crop, is still in debt to a neighbor...[69].

Possibly more remarkable, the peonage system also "began to be applied to Whites" [70]. Hart also noted the operation of the "false pretenses" laws, and gave some typical examples of their operation, usually through the subsequently outlawed device of having a runaway employee arrested, fined, and remanded to the employer. In one instance, a woman made a contract; before it expired, she married a man she had not yet met when the contract was made. Despite this, she was found guilty of "false pretenses" in signing the contract [71].

Even more appalling were some of the barbarities committed against blacks for purposes of enforcing exploitative contracts. In "the most frightful case of peonage as yet recorded,"

> A woman was accused of a misdemeanor; it is doubtful whether she had committed any; but at any rate she was fined fifteen dollars; Turner [a Southern planter] paid the fine; she was assigned to him and he set her to the severe labor of clearing land. And then what happened? What was a hustling master to do with a woman who would not pile brush as fast as the men brought it, but to whip her, and if she still did not reform, to whip her again, and when she still would not do the work, to string her up by the wrists for two hours, and when she still"shirked," God Almighty at last came to the rescue; she was dead [72]!

The popular magazines of the period contain much support for the Exploitation Hypothesis. In the Atlantic Monthy just after the turn of the century, "Nicholas Worth" observed that "A large part of the

Southern people have persuaded themselves that the Negro must be kept to a level reminiscent of slavery, forgetting that on this level he can only be a burden" [73]. This opinion was also expressed in a series of articles appearing in The Outlook at about the same time. An anonymous Episcopalian clergyman of Virginia is quoted there as saying, "I suppose I'll shock you, when I tell you that I still believe in slavery. I believe slavery was of divine origin" [74]. The writer of the latter series went on to observe that disagreements over wage rates and labor supplied were the main source of friction between the races, more so even than the specters of rape and mob violence:

> At any rate, it was clear that employers wanted better work than the negroes would do, and everywhere negroes wanted higher wages than they could get. This labor situation in a region where there are plenty of negroes to do the work needed, and at a time when there seemed to be plenty of work for negroes to do, was oftener mentioned than any other cause--than even criminal assault and mob reprisals--as occasion for mutual distrust between the races, especially for distrust of the negroes by the whites [75].

Another article in The Atlantic Monthly, this one dealing with the famous "Negro Exodus" from the lower Mississippi Valley to Kansas during the late 1870's, indicated that the Southern opposition to this "exodus" went so far as to try "influencing the regular lines of steamboats not to carry the refugees" [76]. This "influence" apparently went quite far, because it was reported elsewhere that "Four of five of the Mississippi steamboats which carried colored emigrants North while the exodus was at its highest last spring [of 1879], have been seized and libeled for violation of the law in taking more deck passengers than their registers allowed them to carry" [77].

Support for the Exploitation Hypothesis can be found in popular farmers' magazines as well. The eminently practical agricultural trade journal The Southern Cultivator included in its helpful advice to farmers recommendations for collusion to regulate labor. In a letter to the editor titled "Concert of Action Among Farmers" in 1869, F.A. Dulany of Camden, Alabama, advised the readers of The Southern Cultivator thus:

> Is it not important that cotton growers should also organize in some manner? Not only the farmers of the North, but professional men everywhere, can see the necessity of association, consultation, and concert of action, but mention the matter to some of our planters (as I have done here) and just ask them to subscribe to the Cultivator, and they begin to decry at once "book-farming"...[78].

This writer left open whether he was referring to concert of action with respect to setting wages, marketing, or whatever, but a subsequent letter to the Cultivator a few months later left no doubt:

> There should be, as there is in almost all other countries, a certain agreed price for all classes of labor, or some system in relation to the matter. As it is, we are all working against each other, and cannot prosper as a country, so long as it lasts....Would it not be well to organize ourselves in the only field that we can operate? The only help is within ourselves, God, and our Mother Earth [79].

Another letter to the editor extolling the benefits of agricultural associations contained the following prescription:

> Laborers might be introduced [to the members of the Association] and those among us better controlled and made more reliable.... Our system must be improved. The time was, when planters relied on physical force to make up for all the deficiencies, but now every furrow plowed and every hill hoed must be paid for in money, and but few [are] willing to plow or hoe [80].

In other words, planters' collusion could substitute for the physical force that served to "control" agricultural labor prior to the abolition of slavery.

It is interesting to point out that the implication of the second letter quoted above is that the planters at that time were actively competing for labor. Indeed, that is consistent with the main point of this examination of the historical sources--a convincing argument can be made for either the Exploitation Hypothesis or the Competition Hypothesis. For the moment, however, only the existence of a desire by some planters to exploit the agricultural laborers and a consciousness of how that might be accomplished needs to be shown.

Advocacy of collusion by planters was repeated much later in the pages of the Southern Cultivator. W.J. Northen, President of the State Agricultural Society of Georgia [81], a frequent contributor to the Cultivator and subsequently governor of Georgia [82], wrote in an article entitled "The Situation":

> All efforts to recover our losses, by tinkering on outside issues, will be worse than vain, until we strike the fundamental trouble and control the labor on our farms. Come together in communities and counties and sections and determine what is fair and just and honest as to wages and service, and then demand it until it is given. There is no necessity for unkind or unreasonable exactions; these would be unworthy of a honorable man; but it is the high duty of every man to do his part in protecting the community against idleness, pilfering and vagrancy, and to encourage and demand, as far as his authority may go, such industry and application as will bring thrift and preserve the good order of society [83].

The rhetoric is high-sounding, but the advice is to combine for the control of labor. Northen was an influential Georgia planter,

and must have represented the sentiments of a wide section of that population. Northen repeated his advice in even stronger terms in 1889:

> Not only in the matter of trusts, but in the management of labor do farmers need uniform discipline and control. Hired help, on the farm, cannot be controlled when its worthless services will be accepted in a neighboring field, with great latitude in idleness and general indulgence. A laborer who leaves the farm and abandons his contract, without just cause, at an opportune time for the farmer, ought not to have opened to him a paying position on another farm in the same community, until his wrongs are adjusted. The labor in a community of farms should be managed under a fair and just policy, determined by farmers in council; and its requirements should be adhered to and strictly enforced.
>
> The management of the labor is the most important element in farm economy. It cannot be successful if farmers are not uniform and cooperative.... [Our] farms must be controlled by the superior intelligence of the landlord, and through a firm discipline, that should be enforced by the uniform management of the neighborhood [84].

At the height of the populist movement in Georgia, a Democratic Party county chairman went so far as to urge the "Democratic Farmers and Employers of Labor in Wilkes County" to use their market power to avert the impending danger of a Populist electoral victory:

> This danger however can be overcome by the absolute control which you yet exercise over your property. It is absolutely necessary that you should bring to bear the power which your situation gives over tenants, laborers, and croppers....The success [of the Populists] ...means regulation of control of rents, wages of labor, regulation of hours of work, and at certain seasons of the year strikes....
>
> The peace, prosperity, and happiness of yourselves and your friends depend on your prompt, vigorous and determined efforts to control those who are to such a large extent dependent upon you [85].

A distinctive part of the afterimage of the late 19th century South is the chain gang. What is sometimes lost among the grisly descriptions

of the abuses which characterized this forced-labor system is that the convict laborers were paid at best a subsistence wage (and sometimes, apparently, not even that). This fact was not lost on contemporary observers, however. "It [the convict lease system] proved profitable . . .to the lessee, as the latter could almost always underbid free labor" [86]. A.B. Hart wrote that

> The men on the chain gang are perhaps employed on city or county work, and if their terms expire too fast, the authorities will run out of labor; hence, the Negroes believe, perhaps rightly, that judges and juries are convinced of their guilt just in proportion to the falling off of the number of men in confinement; and that if necessary, innocent people will be arrested for that purpose....
>
> . . . . . .
>
> On the whole, one would rather not be a negro convict in a Southern state, or even a white convict, for many state and county prisons are simply left-over examples of the worst side of slavery....
>
> The first trouble with the Southern convict system is that it still retains the notion, from which other communities began to diverge nearly a century ago, that the prisoner is the slave of the state, existing only for the convenience and profit of those whom he serves....They [convicts] used to be rented to cotton growers, and a planter could get as few as two convicts or even one, over whom he had something approaching the power of life and death. This was a virtual chattel slavery,.... Governor Vardeman in a public message in 1908 thought it necessary to say that "Some of the most atrocious and conscienceless crimes that have been perpetrated in the State are chargeable to the county contractor. I have known the poor convict driven to exhaustion or whipped to death to gratify the greed or anger of the conscienceless driver or contractor. The tears and blood of hundreds of these unfortunate people cry out for this reform" [87].

Blacks were not the only victims of this system [88], but they were certainly the most frequent victims. Hart concluded that the convict lease system was tantamount to slavery:

> Most of the cases of peonage arise out of the practice of selling the specific services of a convict to an individual; and it carries with it practically the right to compel such a person to work by physical force. What is to be done with a bondman who refuses to touch a hoe, except to whip him, and to keep on whipping him till he yields? The guards and wardens of prisons in the South use the lash freely, but they are subject at least to nominal inspection and control. To transfer the distasteful privilege to a contractor or farmer is to restore the worst incidents of slavery [89].

It is difficult to know exactly how widespread this practice was, but in 1900, all the Southern states still had provisions in their penal codes providing for the use of convict labor in agriculture. The South was not unique in this regard, as many northern and western states also allowed use of convicts in farming. Some northern states, however, such as California, Illinois, Iowa, Minnesota, and New York did <u>not</u> allow the use of convict labor in agriculture [90].

The extent to which convict labor constituted a significant source of agricultural labor is hard to assess, because the exploitation of chain-gang convicts by planters was only one facet of the entire labor market situation. Nevertheless, an anonymous black editorialist eloquently expressed the economic and legal oppression which must have been felt by many of the victims of chain gang justice.

> Colored men are punished in this state [Georgia] without intelligent discrimination; old and young, thug and mischief maker, and often men and women, are herded together after unfair trials before juries who would rather convict ten innocent Negroes than let one guilty one escape. The sentences inflicted are cruel and excessive; 25 percent of the convicts are condemned for life and 60 percent for ten years and more. White men often escape conviction or are promptly pardoned. These slaves of the state are men sold body and soul to private capitalists for the sake of gain, without the shadow of an attempt at reformation, and are thrown into relentless competition

> with free Negro laborers. The fortune of many a prominent white Georgia family is red with the blood and sweat of black men justly and unjustly held to labor in Georgia prison camps: the state today is receiving $225,000 a year of this blood money and boasting of her ability to make crime pay [91].

This passage raises the general question of whether the blacks themselves believed they were exploited in the labor market. The answer is by no means easy to give, especially since Southern black farmers left few records, and had scant access to any medium by which they might articulate their grievances. Judging from scattered sources that do survive, however, there is strong evidence that many blacks did believe landlords unfairly exerted market power against them.

The Southern Workman, newspaper of the Hampton Institute and the organ of the "Hampton-Tuskegee" philosophy of Negro advancement through education and self improvement [92], was hardly a radical journal. Nevertheless, the Southern Workman contains many expressions of perceived exploitation by blacks during the '70's, '80's and '90's. The editors of the Workman apparently believed that on the whole, competition prevailed in the labor market (see the subsequent discussion in Section B of this chapter), yet they opened the pages of their newspaper to statements such as the following:

> ...the colored people are being robbed, cheated, insulted, buldozed and murdered. What will remedy this?....The colored people perform all the labor at the South, make all the corn, raise all the cotton and tobacco, the substance of immense revenue to the white tyrant. Notwithstanding this, the colored people are styled the "pauper class" and twitted by the whites as an improvident, shiftless and worthless class. They are reviled, spit upon, tyrannized over and persecuted. They are branded as cowards and petty thieves. This they have borne with a "patient shrug" and humiliation which are disgusting and which outrage every instinct of true bravery and true

> manhood; which have been the cause of much unfavorable comment from our friends and more ridiculous criticisms from our enemies.
>
> We have increased the cotton crops steadily until the yield has reached prodigious figures and we deserve commendation. But what do we get? The blood of our fathers is the price we receive for our labor. Profaned thresholds we receive for our fidelity and forbearance. Night is made hideous with the yells of denunciation and anathemas directed against us. Riot, racking in blood; mad rapine and organized bands of relentless murderers track us to our homes, our churches, our places of business and our public meetings, and there is no retreat, no succor, no commiseration for us. We must submit to this or take the only alternative--defend ourselves with our manhood, our valor and, if need be, with our blood. We are shot down like dogs, let us shoot back. We are cheated out of our earnings, let us demand renumeration and apply the torch when the demand is not acceded to as the means of removing the subject of contention. We can no longer afford to lie supinely upon our backs to be tread upon by ruthless robbers [93].

One of the main features of Southern Workman was the reprinting of articles and news dealing with Negroes from other periodicals. Several of these references allude to either the desire or actual attempts by Southern planters to re-enslave the blacks. The following excerpt from an unnamed Southern newspaper was given as an example of a body of Southern opinion:

> ...We know several of our largest planters who treat the negroes working for them exactly as they did their slaves, working them from daylight to sundown, allowing no idling; and if a darkey trespasses any of the rules he is tied up and a sound thrashing administered to him; then, if he leaves, the employer hunts him up, brings him back, and doubles the dose. This generally makes an effectual cure, and the offender resumes work, makes a good hand, and is anxious to hire to the same man another year. The employer has got value received out of his hands, and is, consequently, able to pay full wages. Govern your hands, and all sides will be better satisfied. Let them govern you, and the country will soon go to the dogs [94].

In a similar vein, the Workman reprinted a long article from the New York Times dealing with the same subject:

> There are, indeed, in several of the cotton States, notably in South Carolina, Alabama, and Louisiana, a number of so-called leaders who freely express the belief that the negro, to be made useful, must be kept in a state little better than bondage, in short, as nearly in a condition of slavery as is possible under the law.
>
> To bring about this result, the Rifle Clubs of South Carolina and a number of the most prominent Democrats in Alabama and Louisiana are engaged in a determined effort to reorganize the old Labor Leagues, and secure such legislative enactments as will place the unfortunate black laborer absolutely under their control....They ask, in the first place, that agricultural contracts to be drawn by individual employers, or drawn by them and approved by the Labor Leagues...every violation by a colored man of such a contract would be considered a misdemeanor, to be punished by imprisonment, forfeiture of crops, or, as is proposed, in Edgefield and other White League strongholds, by the lash. Further than this, it is proposed that all colored men found out of employment or trespassing upon the lands of the whites shall be regarded as vagrants and punished accordingly. Should such laws go into effect, and their advocacy by the powerful Labor Leagues of South Carolina, and the secret organization known as the State Grange of Louisiana, leaves no doubt that there is grave danger of this being the case, the Southern black men would be almost as completely at the mercy of their white masters as they were twenty years ago....
>
> The Labor Leagues threaten, as a last resort, to openly take the law into their own hands, as they have already substantially done in secret, and agree among themselves not to rent land or give work to any laborer without the consent of his former master, or to buy corn, cotton, or produce of any kind from any employee without the consent of the proprietor of the land upon which it has been raised. In the same way, that is by an agreement among themselves, it will be a very easy matter for the Labor Leagues to determine what rates of wages they will pay their laborers [95].

Interestingly enough, the editors of Southern Workman commented on this article by criticizing its major premise. In keeping with the Hampton-Tuskegee philosophy, they argued that the main problem of the Southern black problem was "internal," a lack of education rather than exploitation by Southern whites. "They [the Times, and Northern liberals in general, presumably] can make votes for themselves by showing that the black

man is in danger of re-enslavement, but would lose votes rapidly by passing around the hat for funds to relieve the negro from his bondage to ignorance" [96]. The interchange is a striking example of the clash of the Exploitation Hypothesis and the Legacy of Slavery Hypothesis. This theme recurred in subsequent issues of the Workman:

> In discussing the schemes of colored emigration, the real issue is quite neglected. The complaint of the colored men in Louisiana, in North Carolina and Mississippi, is, that they are not protected in their political rights, are charged high and excessive rentals for land, or are compelled to pay exorbitant prices for it, when purchased, and that, in short, their condition is very intolerable. There is truth in this statement of grievances, but there are other facts which should modify an opinion based solely on these ex parte statements. Land in the South is cheap enough, and the colored man's money will buy it as quickly as the white man's. We have yet to hear of a case where, under ordinary circumstances, his money has been refused. And in view of the utterly exhausting way all rented land is tilled by the tenant, the rental money is not high. Many white men at the South are at the same disadvantage as the Negro in the matter of paying high rents, and in the inability to purchase land. It is the misfortune of poverty, and there is no exception on race account [97].

Despite its editorial position, the Southern Workman continued to report the statements and activities of more militant black spokesmen. In 1886, an article from Timothy Thomas Fortune's Freeman's Journal was reprinted, in which Mr. Fortune argued the Exploitation Hypothesis in the strongest terms:

> ...we assert, without fear of successful contradiction, that nowhere else in the world can there be found a more odious, unjust and tyrannical landlord system than that which obtains in the South. It is a virtual continuation of the slave system with the landlord relieved of the obligations imposed upon him by the laws of the slave system and his right in the person as well as the labor of the slave.
>
> All the land laws in the South are made in favor of the planters, and it is notorious that the wages paid by them to their employees are simply pauper wages; and this is aggravated

> by the store account and order system by which the laborer seldom ever sees a dime of cash and is frequently allowed to overdraw his account, or is overcharged, for the purpose of being held at the pleasure of the planter [98].

This same Timothy Thomas Fortune was an active and radical black spokesman in the 1880's and '90's. He has been described as "the foremost Negro journalist of his time" [99]. Black and White, written by Fortune in 1885 "during the most radical phase of his career," [100] contains some of the most passionate denunciations of capitalism and exploitation to appear in the United States before or since:

> What are millionaires, any way, but the most dangerous enemies of society, always eating away its entrails, like the vultures that preyed upon the chained Prometheus? Take our own breed of these parasites; note how they grind down the stipend they are compelled to bestow upon the human tools they must use to still further swell their ungodly gains! Note how they take advantage of the public; how they extort, with Shylock avarice, every penny they possibly can from those who are compelled to use the appliances which wealth enables them to contrive for the public convenience and comfort; how they corrupt legislatures and dictate to the unscrupulous minions of the law. The Athenians were wise who enacted into law the principle that when a citizen became too powerful or rich to be controlled within proper bounds, the safety of society demanded that he should be exiled--sent where his power or riches could not be used to the detriment of his fellow-citizens [101].

Fortune also argued that the wage is driven down to subsistence, "to the lowest possible point at which he [the worker] can live and still produce" [102]. Fortune was more specific in bringing similar charges against landowners:

> Every hamlet, town, city, and state in the Union is in the grasp of the individual land holder. Starting with his fellows as a pioneer two hundred and fifty years ago, with his pickaxe on his shoulder, he has steadily grown in size and importance, so that to-day he holds in his hands the destinies of the Republic and the life of his fellow citizens. His bulk has

> become mastodonian in proportions and his influence has shrivelled up the energies of the people. More absolute than the Iron Prince of Germany, he pays no taxes; he limits production, not to the requirements of the population but to the demand of the market, at such figures as he can extort from the crying necessities of the people through the operations of "corners"; he regulates the wheels of government, State and Federal, and dictates to the people by making them hungry and naked [103].

It should not be thought that Fortune was an isolated fanatic. He was editor of the New York Age, which, after two changes of name, became "the leading Negro paper in the country during the 1880's and 1890's," and "in 1887 Fortune founded the Afro-American League, an equal rights organization that antedated the Niagara Movement and the NAACP" [104]. The Southern Workman reported the 1890 convention of the Afro-American League, of which Fortune was elected temporary chairman. One of his speeches at this convention was "frequently interrupted by loud and long continued applause" from the 200 black participants:

> We are met here to-day, the representatives of eight million freedmen, who know our rights and have the courage to defend them. We are here to emphasize the fact that the past condition of helplessness and dependence upon men who have used us for selfish and unholy purposes, who have murdered, and robbed, and outraged us, must be reversed.
>
> We have been robbed of the honest wages of our toil; we have been robbed of the substance of our citizenship by murder and intimidation; we have been outraged by our enemies and deserted by our friends. It is time to call a halt. It is time to begin to fight fire with fire. I speak as an Afro-American, first, last, and all the time, ready to stab to death any political party which robs me of my confidence and my vote and straightway asks me what I am going to do about it" [105].

Another fiery champion of black rights during this period was William Sinclair; ex-slave, missionary, physician, and financial secretary of Howard University [106]. His book The Aftermath of Slavery is,

if anything, more damning an indictment of white "outrages" against the black South than Fortune's book, because of its more explicit catalogue of crimes of all kinds perpetrated against the freedmen. In his chapter devoted to "Negroes and the Law," Sinclair quoted a series of Southern spokesmen advocating a return to slavery of some form, mild or otherwise, and observed:

> As might be expected, illustrations in the concrete of this bitter persecution abound on every hand. Laws are enacted and enforced in the spirit of persecution, and the colored people are the victims of such laws; often they are condemned without even the form or semblance of law.
>
> Regarding the latter, planters have combined or conspired --in defiance of the law--to arrest under false charges the number of colored men needed for service, hold mock trials, one of the conspirators acting as judge, condemn and sentence the helpless creatures to penal servitude; and then divide the laborers among themselves, put them in chains, and work them for long periods of time on their plantations. And this crime is committed against liberty and humanity rather than pay the small wages which agricultural laborers command in the South! [107]

Sinclair next traced out the practices that have already been referred to: penal enforcement of labor contracts, forced labor to repay debts, and collusion between police and planters to secure slave-wage convict labor. He recounted examples of Negroes beaten for attempting to leave the plantations they were working, and noted that "The Department of Justice is preparing to take up again the subject of peonage in the South" [103]. But perhaps the most harrowing passage in Sinclair's book is the first-person narrative of a black man who had been for thirteen years a prisoner in a "peon camp" owned by a Southern state senator. This first-hand account originally appeared in the Independent of New York City, but the quotations are in the words of the

victim. After working as free laborers for a period of years for the senator, and being forced to buy all supplies from his commissary, the narrator and several of his friends decided to leave and seek work elsewhere. The senator said they were free to go, so long as they signed "acknowledgements" of their accumulated debts to the commissary. Anxious to leave, the black men made their marks, only to find

> ...in the papers we had signed the day before, we had not only made acknowledgement of our indebtedness, but that we had also agreed to work for the senator until the debts were paid by hard labor. And from that day forward we were treated just like convicts. Really we had made ourselves lifetime slaves, or peons, as the laws called us. But, call it slavery, peonage, or what not, the truth is we lived in a hell on earth what time we spent in the senator's peon camp.

The wife of the man telling his story was made a concubine of the white men who operated the camp, as were the wives of some of the other Negroes. His wife bore two children by some of the "white bosses," but at least she was able to live in a house. The other women were forced to live and work with the male peons, in dwellings he described as "cesspools of nastiness." Whippings and other tortures were performed on recalcitrant or exhausted peons, with the result that "many came away mained and bruised, and, in some cases, disabled for life."

Recruits to the peon camp were obtained by sending agents to the local courts, advising blacks charged with petty offenses to plead guilty and work off their fines at the peon camp; but the charges made against their accounts at the commissary always exceeded their wages, so that "by the time he has worked out his first debt another is hanging over his head, and so on and so on, by a sort of endless chain, for

an indefinite period; as in every case the indebtedness is arbitrarily arranged by the employer." One of the commonest "crimes" leading to the peon camp was adultery. After his release from the peon camp, while his wife was still held in concubinage, the black narrator summed up his experience:

> I have been here in the district since they released me, and I reckon I'll die either in a coal mine or an iron furnace: it don't make much difference which. Either is better than a Georgia peon camp. And a Georgia peon camp is hell itself ! [109]

Black concern over exploitation, intimidation and forced labor was reflected by the new civil rights organization, the NAACP. The Crisis, official magazine of the NAACP, carried in each issue a "crime report" giving as much information as was available on the lynchings and "outrages" which had taken place during that publishing period. In the majority of instances reported, blacks were lynched for rape, assault, or for no apparent reason at all. The causes of "race wars" or fights between individual blacks and whites resulting in a lynching were often not specified. But at least one case confirmed the observation made earlier that labor disputes were a significant cause of deadly violence:

> On June 13, near Rochelle, in Wilcox County, Ga., McHenry, a Negro who wounded a planter, C.S. Ritchie, was lynched.
>
> McHenry was a tenant of Ritchie's and the two quarreled, the Negro shooting Ritchie, but not inflicting a serious wound.
>
> McHenry was taken to the Ritchie home and identified by the wounded man. Then the mob of "leading citizens" hanged the Negro to a tree near the Ritchie home and cut the body to pieces with bullets.
>
> When Ritchie was shot he was attacking the Negro because the latter was tardy in going to work [110].

Forced labor did not always end in the extreme of murder. The Crisis also reprinted the following letter from the Savannah Tribune, regarding the "large number of Negroes...being arrested as vagrants":

> Is it because there are no loafers among the other races? Or is it on account of the explicit order from the chief of police to arrest Negroes only? A week or ten days ago 108 able-bodied men were arrested and detained in the barracks on suspicion--men who are working every day, or at least whenever an opportunity for work is offered. The "milk in the cocoanut" is that the farmers want cotton pickers at starvation price and worst treatment, and at the same time there will be races with automobiles very soon--convict labor as opposed to free labor is required to further the money-making scheme of a body of enterprising citizens...[111].

Also published periodically was a list of the number of "Colored Men Lynched Without Trial," which gave the following figures through 1911 [112]:

1885	78	1899	84
1886	71	1900	107
1887	80	1901	107
1888	95	1902	86
1889	95	1903	86
1890	90	1904	83
1891	121	1905	61
1892	155	1906	64
1893	154	1907	60
1894	134	1908	93
1895	112	1909	73
1896	80	1910	65
1897	122	1911	63
1898	102		

Total 2,521

If economic history were written according to the advocacy system, the case for the Exploitation Hypothesis could be rested at this point. Surely the evidence presented is overwhelming that Southern labor relations after the Civil War included elements of exploitation. That is

an important fact, but it does not settle the question of whether exploitation was prevalent in the aggregate. There is no way of knowing whether the previously detailed instances were typical or exceptional, and no way of assessing whether some planters' intentions to forcibly control labor were shared by the entire employing class. Even if planters were all of a single mind, it does not necessarily follow that they were able to translate their desires into social reality.

Even these objections would remain rather abstract, were it not for the fact that a similar and, it seems, equally persuasive brief can be written for the Competition Hypothesis. Using many of the same sources, and the same procedure of seeking out direct and indirect evidence of competition in the labor market, it can be "proved" in the same way that the Southern labor market was largely free of imperfections after the surrender of the Confederate armies.

B. Competition in the Labor Market

As with the Exploitation Hypothesis, it is useful to list the kinds of evidence which could be considered support for competition in the labor market. The following list again is not exhaustive, but should be roughly comparable with the list supporting exploitation. Traces of competition for labor will be found in:

(1) Evidence of labor mobility, particularly in response to the prospect of higher wages and/or better working conditions.

(2) Direct evidence of planters' competition for labor.

(3) Expressions of a consciousness or awareness of competition in the labor market, either on the part of the employers or on the part of the agricultural workers. Included in this category would be arguments introduced into debates on proposals such as immigration.

(4) Evidence of a rise in wage levels just following the war, as the market presumably changed from one of slave labor to one with free labor.

(5) Evidence of the existence of alternative employment for agricultural workers, including blacks.

Examples of each of these manifestations or preconditions of competition can be found without much difficulty.

The planters' complaint of a scarcity of labor just after the war was paralleled by objections to freedmen's moving throughout the countryside, refusing to remain and work in one place.

> The first effect of emancipation upon many individuals of the [black] race was to inspire them with a desire to abandon the scenes that had been familiar to them as slaves, and they

> promptly acted upon this impulse; separated from their former homes by their own determination, they obtained employment elsewhere--in many instances in distant parts, of which they had no previous knowledge. Some even doubted whether they had been really liberated until they had tested their ability to leave the old localities without opposition from their former owners. Even if they were confident that they could do so just then, they anticipated that their present liberty would be curtailed so much in the future that they would practically be reduced to their original condition again. An emotion of fear, therefore, urged them to depart. Fidelity, timidity, or sound judgement induced a few to remain permanently where they had always lived, but the vast majority of negroes changed their habitations either immediately or in the course of the first years after they were set free. Many of the largest plantations were almost depopulated of their former laborers, the places they vacated being filled by those who had immigrated from other sections or had come in from the same country-side.
>
> At present, the laborers are not inclined to emigrate to a great distance by the mere force of a migratory instinct; a few do so under the terms of temporary contracts into which they have been tempted by the solicitations of agents, but a large number are rarely influenced to remove in a body to far off States in the mere hope of improving their condition. Within the circle of an extensive division of country, however, they are constantly shifting; they will rent land for one year and set up on their own account as mechanics in the next, or they will work for one planter a month and labor in the employment of another for twelve months, or attach themselves to the same plantation for many years, and then suddenly announce their intention to leave...they start anew as if they were untrammeled, and their ability to do so, is a strong inducement to them to rid themselves of their burdens in one locality by settling in another at a distance [113].

The author of this passage shared the low opinion of the freedmen held by many other Southerners of his time. In actuality, many blacks were motivated to travel by the "impulse" to find family members from whom they had been forcibly separated in the slave market. Even so, observers more sympathetic to the freedmen noted the same phenomenon of widespread black mobility. For example, although Carl Schurz disagreed on the proportions of freedmen involved, he found that

> ...as soon as the struggle was finally decided, and our forces were scattered about in detachments to occupy the country, the so far unmoved masses began to stir....Large numbers of colored people left the plantations; many flocked to our military posts and camps to obtain the certainty of their freedom, and others walked away merely for the purpose of leaving the places on which they had been held in slavery, and because they could now go with impunity. Still others, and their number was by no means inconsiderable, remained with their former masters and continued their work on the field, but under new and as yet unsettled conditions, and under the agitating influence of a feeling of restlessness [114].

This evidence of considerable mobility should be evaluated in light of the fact that not <u>all</u> workers have to move in order for competitive conditions to prevail in the labor market. Only enough need to move to equalize wages between regions and to allow the market-clearing wage to be reached.

Just as the planters' lament that Negroes would not work without compulsion was evidence of a continued desire to exploit, the many statements that freedmen were perfectly willing to work for "fair" wages show planters' willingness to pay the market rate. Schurz wrote that "In the reports of officers of the Freedmen's Bureau, among the documents annexed to this [report], you will find frequent repetitions of the statement that the negro generally works well where he is decently treated and well compensated. Nor do the officers of the Freedmen's Bureau alone think and say so. Southern men, who were experimenting in the right direction, expressed to me their opinion to the same effect." Schurz observed that the number of these satisfied planters was small, but that it corresponded to those who "gave free negro labor a perfectly fair trial," and also that Northern men engaged in

cotton planting "almost uniformly speak of their negro laborers with satisfaction..." [115].

These findings were echoed in the testimony before the Joint Committee on Reconstruction. Major General George H. Thomas, commander of the military division of Tennessee, testified:

> QUESTION: Do the freedmen generally find employment in Tennessee?
>
> ANSWER. I do not know of any difficulty in their finding employment.
>
> QUESTION: And at fair wages?
>
> ANSWER. Yes, sir; and there is a general understanding among the negroes and among the whites that each is to comply with his part of the contract, so that there is no difficulty and no dissatisfaction [116].

The very next witness before the Joint Committee was a Col. William Spence, a Tennessee farmer and former slaveowner. His testimony corroborated General Thomas's:

> In the country where I live in the condition of the freedmen is very good. There is an agency of the Freedmen's Bureau there, but there have been very few cases that have to be taken before it for adjustment. The freedmen have behaved exceedingly well, and have obtained fair wages [117].

Brigadier General James S. Brisbin, a U.S. Army officer stationed in Arkansas, recognized that even though an inclination to reestablish slavery still existed, the general practice was to pay fair wages, and freedmen were perfectly willing to work for those wages [118]. Dr. James P. Hambleton, an Atlanta physician, who had lived in Georgia for 15 years and who admitted that "all my interests are in Georgia," went even further, actually regretting the new-found bargaining power of the freedmen:

QUESTION: What has been the conduct of the negroes during and since the war?

ANSWER. I have seen very little difference. They were very humble and obedient during the war; no people ever behaved better. After the war they were under the impression that freedom meant freedom from labor, and everything of that sort; most of them quit work, and refused to do anything until cold weather came last winter. They fully expected the United States government to clothe and feed them. Since then, a great many of them have made contracts, and are working very well; but the great difficulty is that they will not stick to a contract; they are fickle; they are constantly expecting to do better; they will make a contract with me to-day for twelve or fifteen dollars a month, and in a few days somebody will come along and offer a dollar or two more, and they will quit me--never saying anything to me, but leave in the night and be gone. They are constantly striking for higher wages [119].

Just as the Joint Committee on Reconstruction received testimony that planter organizations had been formed with the intent of regulating wages, it also heard witnesses say that no such organizations existed. Dr. M.M. Lewis of Alexandria, Virginia, testified:

QUESTION. Is there not, generally, among their [freedmen's] employers a disposition to constrain the freedmen to work at low wages?

ANSWER. I rather think not. Like everybody else, they like to get labor as cheap as they can. That is the disposition pretty much everywhere.

QUESTION. Do you know of any combinations among employers to keep down the wages of freedmen?

ANSWER. No, sir; I do not.

QUESTION. There is no general understanding to that effect?

ANSWER. No, sir [120].

The same negative response was elicited from David C. Humphreys of Huntsville, Alabama [121]. Major J.W. Smith, an army paymaster from Little Rock, Ark., did "not see much disposition on the part of the landholders to oppress them [the freedmen], nor do I think there is much danger of it at this time, from the fact that they want their labor" [122].

Other reports show that planters' competition for labor went to even more extreme lengths. It was not unknown that "men came to blows over the hiring of one's former workers" [123]. Such an incident also reveals the bafflement and frustration the planters must have felt in their changed relations with the labor force.

The complaints of Southern planters went much farther than dissatisfaction with the new mobility of the freedmen. Many of the points listed above as potential evidence for a competitive labor market were raised explicitly by the perceptive "Southerner" writing in The Galaxy in 1871. "Southerner's" article deserves to be quoted at length, not only because it contained evidence for competition, but also because it showed the depth of planters' dismay at the turn of events. "Southerner" also addressed various admonitions to other planters to reverse the labor situation.

> ...Migratory and fond of change, sure of a home whenever willing to work on account of the great demand for farm labor, the freedman manifests a singular indifference to contracting, and many of them rarely live two years in succession on the same place. It seldom or never occurs that a man works exactly the same force in different years both as to numbers and individuals.
>
> . . . . . .
>
> The employer or his overseer, though giving good wages, by persuasion, begging, or complimentary encouragement, has to induce the freedmen to work. Often he possesses no power of coercion and cannot even attempt its exercise. All he can do is to control his freedmen by moral influence, persuasion, or example; get an overseer or agent to look after the hands, or dock each freedman for every half hour of lost time. A threat to discharge, or even a discharge itself, would prove of little avail, because in the first place the laborer is wanted, and in the second place he could readily procure another situation.
>
> . . . . . .
>
> With all these drawbacks, it is still absolutely necessary for the planter to have laborers....So he speaks to one freedman after another, mounts his horse and rides hither and thither, sends an

> agent back and forth day after day, announces his willingness to make liberal contracts, does make large offers, bribes his own hands to hire others for him, goes to the towns and villages and addresses the many colored loiterers on the streets, stops at railway stations and sounds the freedmen he always finds strolling near, and thus by one means and another gradually obtains as many hands as he wants, or failing in that, as many as he can....
>
> . . . . . .
>
> ...Occasionally an advertisement appears in a newspaper, declaring that such and such a freedman has broken his labor contract, and that whoever hires him shall be prosecuted according to the law; but it rarely or never occurs that such a prosecution takes place, though the freedman is hired by some other planter. Indeed, it is a difficult matter to discover an absconded freedman, for he can readily find a home go where he will, so great is the demand for laborers.
>
> . . . . . .
>
> Without delay all Southern planters should agree upon some general plan of hiring, some well-understood rate of wages, and some mode of discovering and punishing deliquent laborers. There should be an entire stop put to the custom, now common and considered not altogether unfair, of enticing another man's laborers from him by offering higher wages. A trespass law of general application is needed, which will prevent strange freedmen from intruding upon the premises of others, engaging in mischief, stealing, or tempting the laborers to leave their employers and contract with some one else [124].

"Southerner" also pointed out among the reasons for the disastrous (for the planters) situation that freedmen were being used to build the new railroads, and that "The rich lands of Mississippi, Louisiana, and Texas have drawn many freedmen from other portions of the South, because the larger the yield the higher the wages" [125].

The planter and agricultural magazines also contained evidence of labor market competition. DeBow's Review, in addition to favoring arguments encouraging immigration to freshen competition among the farm workers (the immigration debate will be separately discussed), contained explicit references to competition for labor in the years following the

war. For instance, the "Report on Cotton" in the September 1869 issue argued that planters should make the best of the new situation:

> Inducements to large planting [of cotton] will open employment to every person able and willing to work, and may renew a hurtful competition for labor, leading to excessive wages. All this, however, must be left to adjust itself under the operation of demand and supply, and further results will complete the imperfect demonstration of the past year, that cotton-growing by labor left free to assert its own price, and not burdened by unwise imposts, is cheaper and more profitable to the individual planter than planting by slave labor could be under its most favorable circumstances, while the community will gain in wealth, and the best uses of wealth, beyond anything conceived by men of the past generations [126].

Another writer, arguing against Chinese immigration largely on social and political grounds, reasoned that a Chinese would not necessarily continue to work at the wage he was "imported" to work for, in the face of competition among planters:

> We may remark here, that many persons with whom we have conversed are of the impression that the coolie will always labor at the same rate at which he is imported. Why the coolie should labor alongside of the negro, at less wages than the negro received for doing the same amount of work, we cannot understand. It would be still more incomprehensible that no planter would bid more for the coolie than the low rate at which the importer held him. Have we peonage here? Can a man hold a laborer against his will? If he break his indentures and go away, can the employer follow him with a fugitive slave law? It is rather our impression that if planters, cultivating the earth, should hear that there was half price labor on the plantation of anybody else that they would explain to those laborers their rights, and inveigle them to leave their half price situation. There would be Joss houses and an opium stupefactory, and birds' nests would be sold in the shops. Every inducement would be offered and it is not reasonable to suppose that a faithless heathen, who quits his own country to make money, would resist the temptation to double his wages. We do not say that a day's work of a coolie would be equal in value or price to a day's work by a white man or an African, but that the coolie would receive, before he had made the second crop, as much for planting, plowing, and picking an acre as any one else would [127].

This writer apparently missed the main point of the immigration proponents, that increased population would drive down the market wage (see below, pp. 88-94), but he exhibited no sentimentality about the lengths Southern gentlemen would be willing to go in order to secure the labor they desired. Writing of conditions in Louisiana, another contributor to DeBow's wrote:

> If we consider that all the labor in the sugar districts is and has been fully employed, the question arises, where is the labor to come from for the increased planting? There is room for double the amount if the projected increase is carried out. Can it be obtained for bidding higher for it? We should think it might to a certain extent. Since the war there has been a rush of all classes to the towns, especially of negroes, and that is one of the reasons why some of the plantations have been depopulated. It is now the time for such to return to their proper avocation instead of eking out a miserable existence in the towns. Under the circumstances, we may anticipate what will occur in the country. Those planters who are already under way and able to pay, will outbid their poorer neighbors, and there will necessarily occur a rise in wages. The high prices offered may secure a sufficiency of laborers to those who bid for them. But for those from whom they are taken from may well inquire where they are to get others, and they should look the thing squarely in the face at once. It will not do to imagine that by cunning management and paying a little more, one may obtain the number of hands that he wants. He may be disappointed by the better management of another. In the squabble, for squabble there will be, it will be each one for himself and the devil take the hindmost [128].

Disapproval of this sort of competition for labor was not confined to the aristocratic DeBow's. The more "down-home" Southern Cultivator referred both explicitly and off-handedly to competition among planters for agricultural workers. A "Subscriber" wrote the Cultivator in 1869:

> ...Go to the city of Memphis--and I expect it is so at other places--and you will find farmers from all the country around, hunting up freedmen, and offering them wages that they cannot afford to pay, to go to the country, for the purpose of cultivating cotton. Last year, when farmers determined to raise meat

> and bread enough to supply them, and some to spare, it was not so. Labor was then dependent upon the farmer--now the farmer is dependent upon the laborer, and the laborer knows it, and it makes him careless and indifferent; for he knows that if discharged at one place for indolence, his labor is in such demand, he can readily find employment at another [129].

Another writer in the same issue argued for yearly contracts but weekly wage payments, on the grounds that such a payment system was superior because it discouraged agricultural workers from moving at the end of the year and "exorcised the evil spirit of discontent that possesses them" [130].

The Southern Cultivator also decried the increased bargaining power of the blacks. A Georgia planter complained, "Once we had reliable labor, controlled at will. Now, we depend upon chance for labor at all. It is both uncertain and unreliable; and our contracts must often be made at great disadvantage." Notwithstanding these disadvantages, this planter went on to say that "Negro labor is all we have at present, and is decidedly preferable to any we are ever likely to have..." [131], an admission which is relevant to the dispute over relative black and white labor efficiency to be dealt with in Section C of this chapter.

Calls for "concert of action" on the part of planters to control the wage rate were usually accompanied by admissions of the difficulty of accomplishing such combinations. "Acorn" wrote in 1869:

> ...It is very ridiculous to charge our people with a want of sagacity or public spirit, because they don't see the necessity of organization. Of all classes, the agricultural is the least disposed to act in concert, because it does not feel the necessity. And at the South, where our population is sparse, and every man lord of his own manor, it is not easy to get up social gatherings, at which farmers can exchange opinions and compare notes [132].

Also, the operation of a competitive labor market is hinted by S.W. Trotti, the same contributor who anticipated the Domar Hypothesis (see above, Chapter I):

> ...It is true, under the present order of things, the Southern planter is seldom presented with the alternative of giving higher wages or a cessation of labor; but as a substitute for strikes, he is blessed with what we may call quits, under the operation of which he wakes up some fine morning and finds that half his hands or perhaps all of them without warning on their part, or sufficient provocation on his, have gone into the employment of his neighbor [133].

Planters' awareness of the improved competitive position of the black agricultural workers was even expressed in verse appearing in the Cultivator. (It is of such little artistic value that it hardly deserves to be called poetry.) Repeated over and over for purposes of ridicule are the various aspects of the improved situation of the blacks. One stanza deals with planter-freedman relations:

> Before his throne proud planters bow,
> For help to wield the hoe and plough,
> See him in social confab now
> Beside the Digger--
> His antecedents disavowed,
> To please the nigger [134].

The author of this doggerel was trying to satirize the extent to which the "proud planters" had been laid low--they were forced to actually speak personally to the blacks in order to elicit needed labor from them! To modern eyes, of course, it is the would-be satirist who appears ridiculous.

There is some scattered evidence that the compensation of black agricultural workers rose immediately after emancipation. An article "Condition and Wants of the Cotton Raising States" in the February, 1869

DeBow's Review included the following highly suggestive passage:

> ...We have been compelled for some time past, to recognize the fact that the whole question of labor rests in the hands of the negro. This has been fully illustrated by their conduct since the year 1865, when first they fully comprehended that they were a free people. That year, the hands, with few exceptions, remained in their old situations, and were contented with a share in the cotton and corn crops, ranging from an eighth to a twelfth. In 1866, many, influenced by a desire for change, or a prospect of doing better elsewhere, left their homes, and hired themselves to others. The experience of the preceding year had made them afraid of contracting for a share in the crop; consequently, they demanded money wages, and, of course, money wages had to be paid. The scale of wages, graduated according to the capability of the hand, ranged from six to eight dollars for women, from eight to twelve dollars for men. However, in 1867, they again demanded a share in the crops. But their estimate of the value of their labor had risen, instead of an eighth of the cotton and corn, they demanded a fourth of every thing raised on the plantation. They demanded it, and, of course they got it. If a planter demurred to accede to it, he immediately found himself without hands. Notice, that there was no concert of action on the part of the planters to oppose these ever increasing exactions; had this been done in the first instance, the negro would not have imbibed the idea that his services were indispensable to the planter, and that he had only to name his terms to have them accepted. On the contrary, every man tried to out bid his neighbor, and to fill up his requisite quota of hands at the expense of every one else [135].

This writer went on to argue that "until some competition is produced by the importation of labor, the negro element will have the question of wages pretty much in their own hands" [136]. It would certainly be difficult to find a clearer example of what could be expected to happen during the transition from an imperfect labor market (slavery) to a competitive one (after emancipation).

Other contemporary observers apparently saw the same phenomenon:

> ...Harry Hammond attached significance to the fact that as early as 1866 a freedman in the upper pine belt had come to believe that the share of the laborer should be one-fourth of

> the produce plus food and shelter. By 1869, however, a Negro labor organization was asking half the crop for tenants, and wages of fifteen to twenty dollars for laborers, presumably with state supervision of contracts. Gradually contracts were on their faces liberalized until many of them provided that three-fourths of the crop should go to the tenant and one-fourth to the landlord--an arrangement that was characteristic, it will be recalled, of white tenancy in Chester District as early as 1842 [137].

Southern attitudes towards immigration also revealed the belief of large segments of the population that competition prevailed in the labor market. Both DeBow's Review and the Southern Cultivator contained a large amount of material devoted to a debate on the pros and cons of encouraging immigration into the South after the war. DeBow's Review was generally favorable to immigration. Each issue contained a "Department of Immigration and Labor" [138]. In some cases, immigration was advocated on social or political grounds, usually as a way of strengthening white hegemony by increasing the proportion of white population [139].

DeBow's also advocated immigration specifically to introduce workers to compete with the black labor. A.R. Lightfoot, the same man who observed in DeBow's the increase in wage rates between 1865 and 1867 (see above, p. 87), concluded his article with a defense of immigration on these grounds:

> ...It is evident that until some competition is produced by the importation of labor, the negro element will have the question of wages pretty much in their own hands. Their demands are already so exorbitant, that cotton raising has nearly ceased to be a money making business. As the price of labor goes up, the price of land declines. Cotton lands that were formerly estimated at $30, can now be bought for $10. Rents have fallen proportionally.
>
> Did the tide of emigration set towards the Southern States, instead of from them, these evils would be remedied. Labor would be cheapened, lands would increase in value, and cotton

> raising would once more become remunerative. We want men of capital to come among us, and introduce white labor... we see afar off, a brighter future, separated from us, it is true, by years of privation and endurance, but it is a future of peace and prosperity [140].

The Southern Cultivator also served as a forum in the immigration debate. The "immigration for competition" argument was typified by this excerpt from a letter by "Policy" in 1869:

> Chinese immigration would operate beneficially in preventing the industrious negro from relaxing from industrious habits owing to the bad example of the idle and intemperate; while the latter would see the necessity of reforming, as they no longer commanded the labor market, and must therefore work or starve; while the improved general industry would operate beneficially on the rising generation. An amount of Chinese immigration adequate to effect these objects, would doubtless prove very salutary. War and emancipation reduced the available amount of agricultural labor considerably, and there is a constant tendency to its lessening still more....
> . . . . . .
> ...It is desirable, in his own interest, that the negro should continue industrious, but what security is there that he will, and how is this to be best insured. The introduction of another race, equally capable of laboring under a Southern sun, though comparatively few in numbers, would, by the operation of the spirit of competition, effect the desired object, to the mutual advantage of all parties [141].

David Dickson (a frequent contributor to Southern Cultivator), even in arguing against immigration on the grounds that cotton production should be curtailed and not expanded, made the unusual point that competition between Negro and immigrant labor would drive down wages and thereby lead to strikes which would be to the over-all detriment of the planter class [142]. Another contributor anticipated the salutary effects of Chinese competition on Negro labor:

> ...Bring them [Chinese] here in competition with the negroes, and the latter may find it to their interest to quit stealing and going to the legislature, and go to work in the cotton fields where they belong. If the negroes could be induced to quit loafing about the towns and country, and could all be brought to the plantations, the South would have laborers enough...[143].

It is not the purpose of this discussion to chronicle the entire course of the immigration debate in the post-war South. The point of these examples is to illustrate how some spokesmen who advocated bringing immigrants into the South during these years argued as though they believed that a shift of the labor supply curve to the right would lower the wage. Such a position is compatible with thinking a more numerous labor force would be easier to control and exploit, but given the language of the proposals, which often mention benefits such as the "spirit of competition" which immigration would foster among workers, it seems safe to conclude that at least some immigration proponents held a competitive labor market model in their minds.

The Southern immigration movement has been discussed by other historians [144], and it is interesting to note that many of their conclusions are consistent with what would be expected given the competitive model. Loewenberg rejected the theory that prior to 1880 the South "desired no immigration either from the north or from foreign countries" [145]. Instead, he concluded "There was a definite desire for immigration throughout the whole period which expressed itself in many ways" [146]. Immigration was generally favored by the Southern periodicals, state laws were passed between 1865 and 1876 favoring immigration, travelers' recorded impressions showed a "dominant trend of opinion in favor of immigration, certain Southern real estate firms became agents for labor (immigration) and even after 1880, strong official support continued to be given to immigration bureaus and projects"[147].

Perhaps more to the point is Berthoff's finding that immigration was supported by certain economic interests, and opposed by others. "Plantation owners led the movement to bring in foreigners" [148]. The reason was that "Cheap foreign labor seemed likely not only to replace emigrating Negroes but also to break down Negro monopoly of unskilled labor and so keep wages low" [149]. On the other hand, the majority of Southern people opposed immigration for the same economic reason that prompted the landlords to support it:

> The campaign to develop southern economy on a base of white immigrant labor failed in two ways. First, of the millions of Europeans who came to the United States between 1865 and 1914, only an incidental number entered the South. Second, the economic interests which hoped to profit from immigrant laborers or land buyers never reconciled most of the southern people to an influx of foreigners. In fact, Southerners, though they had little experience with immigrants, in this period became as outspoken xenophobes as those old-stock Northerners who objected to the masses of foreigners actually in their midst....
> ...When confronted with actual groups of foreigners or with visions of a mass immigrant invasion, Southerners, unless they hoped for immediate profit from the immigrants, rallied to defend their race and culture or to repel the supposed threat of economic competition [150].

The Farmers' Alliances, forerunners of the Populist Party, displayed growing opposition to immigration in the late '80's and early '90's [151]. Hostility to immigrants even reached violent proportions--Italians were lynched in Louisiana and Mississippi in the '90's [152].

Other evidence that different economic groups held opposing views on immigration exists. Theodore Salutos found that

> ...determined and tireless as the larger and more influential planters were in their quest for foreign labor, the small white farmers, and to some extent the Negroes, opposed it. The small whites, in particular, were appalled by a fear that

> the country would be overrun by inferior peoples, and that they, as small producers, would be placed at a competitive disadvantage. Apprehensions were also voiced by them over dangers that would arise from the "jealousies and prejudices of races widely differing in character, taste, and traditional customs" [153].

The Southern Cultivator as late as 1889 reported that the Farmers' Alliance of Tuskaloosa county, Alabama, "memorialized" the legislature of Alabama against pro-immigration influence exerted on it by the Alabama Agricultural Society and the Southern Interstate Immigration Convention. The Alliancemen asked, "Will the Legislature spend time and money in an effort to secure cheap labor and salubrious homes for men of other countries, or will it labor to promote the welfare and happiness of the people who are here, and are also those whom the Legislature is supposed to represent?" [154]

Nor was Alliance opposition to immigration schemes confined to the local level:

> An important meeting has held in Meridian, Mississippi, on December 5th [1888]. The National Alliance, the National Wheel, and the Co-operative Union of Farmers and Laborers, merged into one body to be known as the Farmers and Laborers Union, of America, with a consolidated membership of 1,500,000....
>
> A great many matters of vital importance were passed upon. On the subject of emigration a resolution was adopted to the effect that while we will welcome emigrants from the Northwest particularly, and from other parts of the word, we deprecate any attempt to colonize this country with ignorant and pauper population...[155].

Berthoff also found evidence of black opposition to immigration. "More directly threatened than white farmers were Negroes, who might have been driven out of southern agriculture and industry if some immigration promoters had realized their plans. Though almost

inarticulate, Negroes were said in 1907 to oppose immigration" [156]. It is true that the black population was "almost inarticulate," but a few instances of their opposition to immigration do survive.

> And so in the matter of immigration. The material interests of the State [S.C., 1871] clearly demand it. But the blacks are against it, as they fear its political consequences. A late debate in the [state?] Senate illustrated this. A bill was up to exempt new railroad enterprises and various enumerated kinds of manufactures from taxation. A black leader debated it, and in the course of his remarks took occasion to say he had heard, or overheard, a good deal from the class of people whom this legislation was designed to benefit; that it was intended to overslaugh and crowd out the blacks by foreign immigrants, to be introduced into the State by wholesale. Now, he wanted everybody to understand that the blacks did not intend to be crowded out, but that they proposed to stand their ground and, "fight this thing out to the bitter end." He said they might bring on their immigrants, and they would find the blacks ready for them [157].

The Southern Workman printed an editorial (December, 1880) and a letter (May, 1883) identifying the cheapness of Chinese labor as a potential factor in depressing all wages, even though the editorial policy of the Workman was one of not opposing immigration, since it would expose the Chinese to Christianity [158]. And the Southern Workman was not the only black periodical to register opinion against immigration. Alexander's Magazine in 1906 realized that "It has been one of the pleas of southern senators in congress to increase the influx of immigrant Poles, Italians, Swedes, etc., in the United States in order that the South might get a sufficient stock of cheap labor to supplant the Negro." The article went on to deplore the displacement of Negro day labor by immigrants--barbers, bootblacks, railroad hands, street gangs, and brick-yard forces.

> ...The South will have its choice of cheap European labor or that of the despised Negro. In a choice between a white man and a Negro, for the same position, in the South the Negro must suffer, whatever his qualifications....Many times the South has threatened to import foreigners to force out Negro labor. This move on the part of the government will accomplish what the South has longed for--it will make Negro labor no longer a necessity. The common laborer being forced out of employment, the existence of the professional class will inevitably be undermined. Sooner or later the Negro must turn to some other corner of the earth to work out an existence [159].

Alexander's apparently held a strange view of how competition works--rather than the tide of immigrants depressing wages, the magazine thought it would only result in blacks being displaced by immigrants. Whatever its economic theory, Alexander's feared the competition of immigrants and correctly perceived the motivations of many white Southern immigration boosters.

Leaving the immigration debate, references to competition in the labor market continued through the last decades of the 19th century. Charles Nordhoff, a correspondent for the New York Herald, concluded on the basis of a tour through the cotton belt in 1875 that

> The system of planting on shares, which prevails in most of the cotton regions I have seen, appears to me admirable in every respect.* [*Most economists consider it a bad system.] It tends to make the laborer independent and self-helpful, by throwing him on his own resources. He gets the reward of his own skill and industry, and has the greatest motive to impel him to steadfast labor and self-denial.
>
> I have satisfied myself, too, that the black man gets, wherever I have been, a fair share of the crop he makes...[160].

Similarly, the Report of the Industrial Commission contains testimony that would indicate that neither the law nor the market situation was entirely unfavorable to the agricultural worker. The Hon.

O.B. Stevens, Commissioner of Agriculture in the State of Georgia, indicated that it was very easy for tenants to move from farm to farm, despite previously contracted indebtedness.

> Q. Is the indebtedness any sign on the part of the government or the renters holding to a condition of poverty, or is it the result of some other influence?
>
> A. There is nothing whatever to force a man to stay on the farm. They usually rent these lands from year to year.... If the tenant is dissatisfied for any cause, he has a perfect right to go whenever he wants to. The landlord has no lien and no claim upon the property of the tenant whatever except for rent and advances, and those only apply to the present crop.
> ...
> Q. What would be the position of a man, however, who had defaulted on one farm? What would be his probability of being able to get another farm in that locality, provided he did not liquidate his indebtedness in the first instance?
>
> A. Oh, he would not be regarded as a first-class tenant. But there is always plenty of room there for everybody, and he always gets a place and gets along in some way. Some people always take him up....
> . . . . . .
> ...Sometimes you have a tenant on a place, and he finds he can do a little better somewhere else, and he moves off and goes to the next place. Sometimes the landlord finds that he can get a better tenant than the one he has. He lets this fellow go and gets the other fellow. They are continually moving around from place to place [161].

Another witness confirmed the existence of the Alabama law making it a misdemeanor to break a contract, but also noted that this law was seldom enforced [162]. Turning again to O.B. Stevens of Georgia, he stated "the law in our state protects the laborer in every instance," and attributed the poverty of the blacks to "the fact of bad management upon the part of ignorant tenants," rather than to exploitation by whites:

> ...The garnishee law does not apply to wages. The law provides that wages for labor of any kind can not be garnisheed. Labor is protected all around....
> . . . . . .

> Q. ...I would like to learn what is the cause of the fact as you stated, that at the end of each year a great many of the tenants make no money--they are in debt. Is it because of the oppressive disposition of the white people to drive hard bargains, or is it because of the bad management of the tenant when freed from the general management of the white people? Or is it because of the bad system? Are the system and the law bad?
>
> A. The law has nothing whatever to do with the systems that are adopted for farm labor; nothing whatever. The only law that we have is the law that protects a laborer in collecting his wages, either one way or the other.
>
> Q. Now, may I take the liberty of suggesting that that is a sufficient answer to that phase of the question. It is not the law. But is it the oppressive disposition of the white people?
>
> A. No...[163].

Such testimony from potentially biased planter spokesman must be taken at something less than face value. But on the other hand, what is being demonstrated here is the existence of a substantial body of opinion favoring the hypothesis that the labor market was competitive in Southern agriculture during the period under review.

It has already been noted that the legal history of Southern labor legislation fluctuated between the passage and nullification of repressive laws. One legal scholar writing in 1910 gave a fairly optimistic assessment of the legal situation of black labor. His case was based on the difference between laws pertaining to race <u>distinctions</u> (the "Jim Crow" separate facilities laws) and the laws directly restricting the economic freedom of labor:

> Race distinctions do not appear to be decreasing. On the contrary, distinctions heretofore existing only in custom tend to crystallize into law. As a matter of fact, most of the distinctions which are described above as the "Black Laws of 1865-68" [the infamous Black Codes] are no longer in force. No state now carries statutes prescribing the hour when a

> Negro laborer must arise, requiring his contracts to be in writing, prohibiting him from leaving the plantation or receiving visitors without his employer's consent, or exacting a license fee of him before he can engage in certain trades. These laws were vestiges of the slave system and survived but a short time after that system had been abolished [164].

The authors of several modern monographs dealing with the South during this period have also come to the conclusion that strong elements of competition were prevalent in the labor market. According to Roger Shugg, in Louisiana after the war "...the free Negro did not work as hard as a slave,* had less supervision and discipline,...** Trouble often arose because planters would compete with one another in bidding for hands. This practice almost demoralized Negroes on the sugar plantations, according to Bouchereau,*** and led to unorganized strikes and much dalliance before signing contracts for a new year"**** [165].

LaWanda Cox uncovered one such strike of agricultural workers for higher wages in 1880:

> ...attempts on the part of Negro field labor to strike and organize were infrequent after Reconstruction. There exists, however, an interesting account of a strike for higher wages by Negro workers on Louisiana sugar plantations in 1880. The Negroes went from plantation to plantation getting others to join them. The State militia was sent out and the ringleaders were arrested, tried, and imprisoned for trespass. Petitioning the governor for pardon, they stated that they had thought it within their rights to go where other laborers were working, even though on the property of an individual, and induce those laborers to join them. They now understood this to be a violation of the law. "When laborers differ with their employers hereafter about the price of their labor," the petition read, "it will be in a peacable manner and with law always on their side." They were released and "quiet was restored." ....Conflict between southern laborer and landowner took forms other than overt clashes. Most notable was the continued bargaining throughout the period over wages, shares, or cash rentals, with each party trying to obtain whichever arrangement would assure him the largest income [166].

Enoch Banks' Economics of Land Tenure in Georgia is an old though still useful economic account of the Southern post-bellum agricultural economy. Banks, writing in 1905, observed the frequent movement of blacks following emancipation, although he attributed much of this mobility to a "political motive" distinct from response to wage differentials or other economic incentives [167]. However, he did comment on the economic motive (wage incentive) involved in migration of laborers off the farm, whites to cotton-manufacturing industry, and blacks into the cities, both responding at least in part to the lure of higher wages [168]. Interestingly, Banks apparently anticipated the major result of this investigation, namely, that agricultural labor received a wage equal to the value of its marginal product:

> The same fundamental economic law works...the laborer tends to get that part of the product for which he is economically responsible [169].

He also believed, however, that this result would only be obtained when the plantation-wages system of labor payments replaced the sharecropping system, and that the laborer

> ...is economically responsible for a larger absolute amount under the plantation system than under the cropping system and fundamental economic law will tend to give this larger amount to him [170].

Thus Banks believed in marginal product factor pricing under a straight wage payment system, which he felt was more efficient than a sharecropping system. It will be shown later that under plausible assumptions the form of agricultural tenure had no impact on distribution or efficiency. (See below, Chapter III.) For the moment it is sufficient

to point out Banks' conviction that some measure of competition prevailed in Southern agriculture at the time he wrote.

Vernon Wharton, in his meticulous study The Negro in Mississippi, found that after 1867 there

> ...was a change in the attitude of the planters, and especially of the editors and public leaders. They had become reconciled to the fact that slavery was dead, and that codes to enforce peonage could not be applied. It had become apparent that the Negroes must be paid, and that their right to move about in search of better contracts could not be blocked [171].

However, some of Wharton's other evidence shows that this acquiescence may have been superficial. During the great Negro "Exodus" of the late '70's, the "small white farmers and their representatives, a majority of the white population, probably wish to see the Negroes removed from the state as rapidly and as thoroughly as possible because 'they could not compete with the Negroes in the production of cotton and could have no hope until the freedmen were gone'" [172].

> The attitude of the employer group was an entirely different matter. They prophesied general ruin for the state if the Exodus continued, and quickly turned to newspaper propagand (sic) to try to dissuade the emigrants.* When propaganda failed, some did not hesitate to use violence. This included the use of irregular courts,** the breaking up of crowds of Negroes waiting for boats,*** the arrest of emigrants on charges of vagrancy and of obtaining goods under false pretenses,**** and the beating and kidnapping of Negro leaders. ***** [173]

The same tension between imperfection and competition in the labor market is evident here as elsewhere. The care and conscientiousness of Wharton's research in effect uncovered both conflicting tendencies. Nevertheless, he felt confident to summarize the consequences of emancipation thus:

> The chief advantage that freedom brought to the Negro was the ability to move about, and thus to establish among the employer class a certain amount of competition for his labor...[174].

Finally, it is again possible to examine statements by blacks themselves regarding their view of the operation of the labor market. Again, it is difficult to find Southern black spokesmen. In keeping with the Hampton-Tuskegee philosophy, the Southern Workman's editors generally believed that the labor market was competitive, and that blacks could increase their incomes only by increasing their level of education and following that up with hard work. In an 1875 review of the Southern press, the Workman prefaced its compilation by remarking that Southern blacks were "deeply stirred by recent political events," and that in addition, "Like any other people, they will in the end collect in those regions where they are best treated and best paid" [175]. Later that same year, the Workman carried an article titled "A Few Words on the Labor Question," written by a planter who saw unmistakable evidence of employer competition for black labor:

> If, as owners of the soil, possessors of what little capital there is in the South, and with a superior intelligence, we do not control the labor of our land, the fault lies at our own doors. We have no system, no concert of action. To the contrary, we are constantly pulling against each other. We are the employers, but every farmer has his own notion of things, and cares nothing for his neighbor's plans. If I hire hands for wages, one of them may at any time conclude to leave. If so, he only goes across my line fence and my neighbor hires him [176].

Beginning in 1878, the Workman carried a series of articles on economics by T.T. Bryce, and in these articles, Bryce put forward what

essentially amounted to a competitive model of the determination of wages, interest, and other prices. For example, Bryce argued that the wage rate is determined by supply and demand:

> The next great law of exchange that I would apply to labor, is the law of demand and supply....If there be two men wanting to buy labor (that is, to hire it), and only one man to sell his labor, it is certain the man who offers most in exchange will secure the labor. If, on the other hand, there be two men to sell their labor, and only one to buy it, it is equally certain that the one will be hired who will sell his labor cheaper. This law of demand and supply is a law of nature, and no amount of legislation can change it, any more than it could prevent the earth turning on its axis....
>
> . . . . . .
>
> Labor has its market price, just as corn or cotton; if there be a large supply and small demand, prices will be low; if there be a small supply and a large demand, prices will be high-- and no amount of law making, nor mass-meetings, will prevent it. Everyone tries to buy as cheaply and sell as dearly as possible; the man with labor to sell will take the highest price he can get; the man with labor to buy, will give as little as possible; the price they may agree upon is the market price, and neither close the bargain if they really think they can do any better for themselves. Buyer and seller <u>together</u> make the price, <u>neither</u> can do it <u>alone</u>; and a Government has no more to do with the price of labor (that is, the rate of wages) than it has with the price of potatoes. No Government can fix the price of labor, that is, it cannot say wages shall be so much or so little. No man can be compelled to employ labor he doesn't want; and no man can be compelled to labor for wages that do not suit him [177].

Would-be exploiters of labor may have had an easier task than trying to "prevent the earth turning on its axis," but Bryce clearly had legal controls and labor associations in mind when denouncing the futility of "law making" and "mass-meetings". Bryce also condemned both forced labor and violent strikes:

> ...Everyone who attempts to steal another's purse, or deprive him of his life, is seized and punished by the law. So, too, with a man's labor; he has a right to the peaceable enjoyment or employment of it, and anyone who attempts to interfere with

> such peaceable enjoyment or employment by the use of threats, violates the law, and should be punished by it, as much as if he had tried to wrest from him his purse or his life....
>
> That all men with particular interests in common should unite for mutual protection and encouragement is most proper; that they should endeavor to get the best pay, or, in other words, the most in exchange for their services, is right and just; but their efforts must be through reasoning, and the means of the market-place--and not through violence or threatenings [178].

Bryce also believed that "No 'strike' is ever successful, unless the wages being received by the help are under the market rate" [179]. The soundness of Bryce's economic reasoning is not at issue here; what is important is the prominence given to his articles in the Southern Workman. In addition to the article titled "Labor" from which the excerpts quoted above were taken, subsequent issues of the Workman contained articles on "Capital" and "Wages," all emphasizing the same theme, that competitive conditions were the rule in all markets [180].

Most of the Workman's references to the causes of the various "Exodus" black mass migrations of the '70's and '80's emphasized response to wage incentives. An article reprinted from the Newberry, North Carolina Herald stated:

> The Texas fever has laid a strong hold upon the Newberry Negroes. The week before last one hundred and fifty left this place for Texas; we learn that a large party will go tomorrow, and another party on the following Friday. Some of these emigrants are well-to-do Negroes, but they say that labor is too cheap here and their wages too hard to collect after they have been earned [181].

A similar analysis was offered by the Workman itself, later in the same decade:

> The exodus again in progress among the colored people--from North Carolina into Arkansas, Mississippi and Louisiana, at the invitation of land companies who pay their way and sell

> them land at nominal prices--may result, like former movements of the kind, in considerable individual suffering and disappointment, but also, like those, in more of general benefit. It has at least several encouraging suggestions--as showing, for instance, that the Negroes are wanted and welcomed in some parts of the country at any rate, and furthermore, that they are capable of taking hold of their own problem, and settling their questions for themselves. The motive for emigration seems to be chiefly in depression of labor and wages, from failure of crops on the worn out tobacco fields [182].

As with the other issues, however, Southern Workman was not single-minded. In May, 1879, it carried with a favorable preface a letter to the New York Herald of April 14th, from "a clergyman and native of the South," who argued that the exodus (which must have been the great Mississippi Valley to Kansas exodus) was due not so much to "political intimidations and even outrages against the negro in the South," as to exploitation:

> ...They [blacks] realize the fact that their emancipation in the South has only lifted them from slavery into serfdom.
>
> Behind all this stands the fact that the negro in the South is systematically cheated out of his wages....He rents a tract of land and the landlord has a lien against the whole crop for the rental. It is a penitentiary offence to move any part of the crop from the place before the landlord is satisfied for his rents. The landlord has the first claim on what the negro makes....
>
> ...Of course under these circumstances emancipation is a huge disappointment to the negro. He is in a worse condition than he was in slavery. The white money lender gets all the fruit of his labor, and is under no obligation to feed and care for him and his children.
>
> The ultimate effect of all this will be disastrous to the South.
>
> ....It is already having the effect to drive the negro out of the South....The remedy is very simple--even-handed justice to the negro as a laborer. This will hold him in the South. Nothing else will [183].

This contradictory note is an appropriate one for ending this discussion of the Competition Hypothesis versus the Exploitation Hypothesis. It has been shown that on the basis of only the narrative accounts surviving from the post-bellum period, a strong case could be made for either hypothesis. There is no doubt that the incidents related here did actually take place--there were peon camps and there were blacks who responded to wage incentives in moving from place to place. The repressive laws at times were part of the state penal codes, and these laws at other times were overruled by the courts.

The fundamental question which cannot be answered by this sort of investigation is whether Southern agricultural labor was exploited in the aggregate. At any point in history, a society is likely to generate unusual, even extraordinary injustices. The problem of historical interpretation is not primarily concerned with these exceptional cases, but with the general tendency or trend. Enough reported instances of both exploitative and competitive behavior exist to support either hypothesis about the Southern agricultural labor market. It remains to be shown, using quantitative and statistical methods, which hypothesis prevailed for the South as a whole.

C. The Relative Merits of Black and White Agricultural Labor

The degree of competition or imperfection in the labor market is not the only interesting economic issue of the late 19th century South. Perhaps of equal interest, because of its connection with the Legacy of Slavery Hypothesis (that the black population emerged from slavery deficient in education, initiative, and enterprise, and hence was low in productivity relative to the whites), is the question of whether there was any significant quality difference between black and white labor during the period. At least one careful historian, B.J. Loewenberg, has concluded that Southern opinion after the Civil War was in agreement that free black labor was inferior to white labor [184]. This assessment is derived from the often-repeated stereotype of the lazy, shiftless, irresponsible freedman, which was so common in the 19th century literature. Because of the ubiquity of this stereotype, only a few typical examples of it in its "original" form will be presented here. It is no surprise that many planters and other whites thought badly of the capabilities of the Southern blacks; what may be unexpected is the large number of planters' statements that black labor was equal or superior to that of whites.

It should be pointed out that for the "inferiority" of a certain type of labor to have an economic meaning, "inferiority" must refer to lower productivity, ceteris paribus. One type of labor will not be considered "inferior" in the context of this discussion if the employers simply have a taste for the other. Similarly, a difference in productivity attributable to differences in capital per man or the fertility

of the land farmed cannot be counted as labor "inferiority." The Legacy of Slavery Hypothesis refers only to deficiencies in human capital or acculturation which might have followed the freedmen out of slavery. Nineteenth century observers rarely, if ever, conformed to the ceteris paribus requirement in their comparisons, so their evaluations of labor productivities are only of limited value. Nonetheless, their views on black as against white agricultural labor are still suggestive.

The Land Occupancy and Ownership Hypothesis (that productivity differences were associated mainly with soil quality differences) will not be discussed in this section at all. That discussion will be deferred until after the presentation of the econometric results, in order to be able to state with real precision what race-associated productivity differences must be explained by any proposed hypothesis. This section will be confined to a simple survey of the 19th century comparisons of the effectiveness of the members of the two races in Southern agriculture.

Philip Bruce articulated one very common theme of the planters, that the blacks were simply incapable of farming successfully without white supervision:

> The greatest injury which a planter can inflict upon the interests of the community in which he lives, is to rent the whole of his estate in small lots to colored tenants, especially if he abandons his home permanently to dwell elsewhere, leaving his property entirely in their hands. The quality of the soil begins at once to depreciate from improper usage and careless cultivation; the buildings and fences soon fall out of order from natural decay or the depredations of pilferers; the teams decline to the poorest condition; the crops produced are of an inferior quality. But this is not all: such an estate soon becomes the safe harbor of all the depraved negroes in the

> vicinity; the vicious habits of the women and men alike increase owing to their removal from the control of the proprietor; thievish and superstitious practices are more common and open, and brawls and quarrels arise more often than elsewhere [185].

Such a pessimistic view did not prevent Bruce from remarking elsewhere:

> It is plain that in the general conflict between whites and blacks as laborers, the negro enjoys the chief advantages. He is physically as vigorous and stanch as the white man; and is more cheerful and more easily managed; he lives in happiness under material conditions that would be intolerable to the humblest white laborer; and has no sentiment or pride that will prevent him from seeking any kind of employment, however disagreeable that employment may be to ordinary sensibilities, or in what degraded situations, it may place him.
>
> Not only can the negro successfully compete with the native white man, and drive him from the field, but he is also able to expel the immigrant competitor who does not shrink at all from working in his company and at the same tasks [186].

Perhaps these alleged qualities explained why "The large planters prefer to make up their complement of hands by employing negroes alone" [187]. Buried under the racial stereotypes, Bruce was grappling with two contradictory ideas. His notion of the racial inferiority of blacks required that they be incompetent farmers or tenants; yet he was also faced with an observed predilection of at least some planters for black workers. This contradiction reappeared, and undermined the attempt of many a post-bellum planter spokesman to achieve consistency in his writings about the merits of various types of plantation labor.

Contributors to Southern Cultivator also expressed doubts about blacks' capabilities:

> ...planters persist in giving a poor ignorant, lazy, superstitious being, who has no property and never intends to have anything if he can help it, an interest in their crops....
>
> The labor question is a vexed question in the cotton belt; yet I believe there is a sufficient amount of labor in the

> South, if it could be judiciously controlled, the opinion of a great many intelligent planters to the contrary notwithstanding. If the negro with his ignorance, superstition and natural inferiority, can't be controlled by the planters of the South, we as a class are the poorest business men that we have ever read about [188].

A very extensive outline of this "black inferiority" argument is given in a much later issue of the Cultivator, in 1889:

> Following up the communication in the last issue of The Cultivator... I am led to say, that the most marked difference between farm methods at the West, and those practiced at the South, will be found in the labor employed. Farm labor in Ohio is far superior to farm labor in Georgia. Ohio farmers positively decline to employ negroes in their fields, when it is possible to secure white labor. They say they have uniformly found negroes "indolent, careless, wasteful and destructive. Their idleness requires constant attendance to keep them at work; their carelessness, close supervision to see that their work is properly done; their wastefulness and destructiveness would bankrupt any man of moderate means, who is not constantly gathering up behind them."
>
> . . . . . .
>
> It has been frequently said that the South will never have any better farm labor than negroes. If so, I am sorry for the South, unless they are to be greatly improved. Negroes are thriftless, not caring to accumulate for themselves and, of course, indifferent to the accumulation of their employers. They are extremely idle, and, therefore, cannot be made profitable without expensive supervision. They are very destructive to property and abusive to stock. In these evils they have been indulged, until their character and conduct have become uniform for evil [189].

It should be noted that even in the middle of his condemnation of black labor, the writer felt obliged to acknowledge that "It has been frequently said that the South will never have any better farm labor than negroes." Other magazine references to the alleged inferiority of black labor can be found. For example, "Nicholas Worth" in his Autobiography alleged that black labor actually deteriorated after emancipation:

> ...The negro was the principal laborer in producing cotton, and, without training as farmer and as man, he was becoming a less efficient laborer. They practically forbade his training. The pitiful short-staple yield of impoverished acres was sold for the starving price of low grades because it was not skillfully nor promptly gathered from the fields; it was wastefully handled; it was sold to pay mortgages on itself. Life could rise no higher till efficiency and thrift came in [190].

A similar opinion was voiced in DeBow's Review:

> ...To work large plantations with our present labor is clearly impossible; and the greed for land will hardly endure while weeds choke up the broad acres once so productive. We have the soil and the market to ensure successful farming; but we have very little of the skill and knowledge necessary to attain the highest results....
>
> It is evident enough that at present even a small plantation, or farm, as I presume they will in the future be called, cannot be successfully worked by Freedmen...[191].

The hearings before the Industrial Commission in the 1890's also included the same sort of testimony.

> ...I think one of the causes of the depression in agriculture in the South is the presence of the negro. The negro does not know how to use improved implements, and does not want to know how, and it is almost impossible to teach him. If a man farming cotton on an extensive scale puts an improved implement in use, every darky says it is impossible to use it, and they do not. They enter very largely into the agricultural conditions of the South; the people rent to them, and work on shares with them. They are averse to making anything in the world except cotton. They do not want to make corn. They love watermelons better than any people or any nation on earth, and they do not know how to make watermelons. They do not care anything about knowing how, but they do love them....I believe the presence of the negro in the South will retard its progress, its industrial and moral development, and its advantageous development, and its social development, agricultural development, and all other kinds of development; and the question is now, What are you going to do about it? Bishop Turner advocates a separation of the races. I am with him on it....There is no question but that if the negroes were removed from our country their places would be filled in the future by more intelligent labor [192].

One of the methods used to "demonstrate" this inferiority of black labor was to compare the output per man of blacks and some other group of farmers, and to conclude from lower black output per man that black labor was deficient. This dubious methodology was employed by an article in The World's Work, the June, 1907 issue of which was devoted entirely to the South. The article, titled "Immigration to the South," reported a "test" which was performed on "the 'Sunny Side' property, on the Mississippi River, in Chicot Country, Arkansas." Negro work squads were compared with Italians, and it was found that "the Italian seems to have produced more lint per hand, by 1,410 pounds, or 120.1%, and to have exceeded the Negro's yield per acre by 170 pounds, or 72.9%. The difference in money value in favor of the Italian was $148.89 per hand, or 115.8%, and $18.41 per acre, or 69.8%." It was also found that the Italians had been more successful in accumulating work stock and in liquidating their debts at the end of the year [193]. There were several flaws in this "experiment." First, there was no control for the fertility of the land farmed by the two groups of workers. Second, there is no guarantee that the black farmers did not face some sort of discrimination that the Italians did not face, such as discrimination in purchases of capital equipment. Third, the Italian immigrants may not have been randomly selected representatives of white agricultural workers. They may have been particularly energetic and innovative simply because they were immigrants. These objections notwithstanding, the type of calculation presented in this Arkansas experiment was undoubtedly widely accepted as evidence of the inferiority of black farm laborers.

Fleming reported a similar calculation, made in the 1880 Census. The main points of the Census report were

> 1. That where the blacks are in excess of the whites there are the originally most fertile lands of the state. The natural advantages of the soils are, however, more than counterbalanced by the bad system prevailing in such sections, viz., large farms rented out in patches to laborers who are too poor and too much in debt to merchants to have any interest in keeping up the fertility of the soil, or rather the ability to keep it up, with the natural consequences of its rapid exhaustion and a product per acre on these, the best lands of the state, lower than that which is realized from the very poorest.
>
> 2. Where the two races are in nearly equal proportions, or where the whites are in only slight excess over the blacks, as is the case in all the sections where the soils are of average fertility, there is found the system of small farms worked generally by the owners, a consequently better cultivation, a more general use of commercial fertilizers, a correspondingly high product per acre, and a partial maintenance of the fertility of the soils.
>
> 3. Where the whites are greatly in excess of the blacks (three to one and above), the soils are almost certain to be below the average in fertility, and the product per acre is low from this cause, notwithstanding the redeeming influences of a comparatively rational system of cultivation [194].

Apparent white productivity advantages were attributed to superior white skills despite inferior soil, while black disadvantages were said to persist despite blacks' location on the most fertile soils. These findings partially anticipate some of the later results of this study, which shows productivity differences associated with both race and crop. The detailed identification of the productivity differences between the groups will prove to be somewhat different, as will the interpretation of those differences, however. Fleming also reported a productivity calculation based on the 1900 Census. In this latter calculation,

J. C. Hardy, president of the Agricultural College of Mississippi, found that predominantly black counties with high per-acre land values produced less output per acre than predominantly white counties with low per-acre land values [195]. Hardy also reported that the counties in which black farmers were more closely managed by whites were more productive than the black counties in which not many white managers were employed. While Hardy conceded that "...this difference is partly caused by a difference in the fertility...," he asserted "...the principal reason is due to the superior intelligence used in the management of the first group [where white management prevails]. This is proved by the fact that in every comparison made between a white county and a black one the black was the most fertile, yet the white was nearly twice as productive" [196]. Apparently, Hardy believed that land prices are a better measure of fertility than output per acre. But just as output per acre is inadequate as a fertility measure because of possible differences in land/labor ratios and capital stocks across counties (as well as potential race-associated differences in labor productivity), so also land values might reflect factors such as transportation costs and other locational factors distinct from the intrinsic physical and chemical fertility of the soil. Land values could even reflect the market power of landlords. Clearly these calculations are inadequate, but Southern opinion supporting and conditioned by them was both substantial and influential.

Despite the prevalence of this stereotypic conception of black inferiority, the opposite view, that black agriculturalists were in no

way deficient compared to whites, was surprisingly widespread. There is no dearth of statements testifying to the quality and skill of black farmers and agricultural workmen.

As early as 1863, a representative of the New England Educational Commission for Freedmen enthusiastically reported the progress of South Carolina blacks. This remarkable letter is worth reproducing in full:

Ashdale, near Beaufort,
S.C., August 8th, 1863

> The colored people are doing well generally. They are quite industrious, and well informed in all that appertains to raising the cotton and all the other productions of the soil. They are very much interested in all those products that form the means of their subsistence. They are laboring assiduously to procure in the coming harvest sufficient to supply all the wants of the body, with some amount to sell. The Governor of this department in the spring cut off the clothes and rations from all the people that were able to labor in the fields, and it has proved one of the most efficient means of promoting industrious habits among them. So long as they saw before them a source from which they could draw food and clothes, they were contented, and these contributions had a deleterious effect upon them. Now they are aware that if they do not produce sufficient to support themselves, and purchase their clothes, they must suffer, and they are quite ambitious to get as much as possible. It is quite surprising to see the ingenuity and tact which many of them exhibit to accomplish that end. They certainly have imbibed largely the spirit of trade and commerce, by which they increase their revenue. Their little fields are guarded with the strictest care, and the growth of all the products watched with much eagerness, and the profits calculated by them, as much as the cargo and the profits to accrue therefrom are, by the great shippers of our commercial marts. They are fast learning the value of money, and acquiring an idea of property, whether it be in a horse or land. There is a growing desire among them to become owners of land. Hundreds of them are guarding their little stores with jealous care, and adding to their stock all they can, in order to have sufficient to make purchases at the next sales of land. To be able to receive all the proceeds of their labors, is one of the heights of their ambition. The adjoining plantation to the one where I live, was purchased last year by the negroes. They have

> worked it themselves without any direction from white people. They have exhibited all the skill, thus far, of those that have been worked by the Government. They have a large field of cotton, and a larger one of corn. I see them frequently, and converse with them about it. They are as proud of their labors as are any of the farmers of the North when success follows a period of industry. They have planted and brought to good growth by the necessary working three acres of cotton, each of which is, I am told, the maximum of one person's allotment, when other crops are worked by the same hand to the maximum. This condition of that plantation excites the emulation of all the surrounding people, and they frequently say that if they could work this land in the same way we could see some great crops. I have no doubt that if the negroes owned the land and could work it with the expection of receiving all the proceeds, the cotton crop would have been increased one-third, if not one-half.
>
> So far as the question of subsistence is involved with these people, there is not the least doubt about it. They are abundantly competent, and able and willing, to support themselves, and in a short time many of them will acquire a competence that will enable them to demand and supply themselves with many of the comforts of civilized life.
>
> [signed] A.B. Plimpton [197]

The Joint Committee on Reconstruction heard many witnesses who thought the blacks were doing well after emancipation. The same Col. Spencer of Tennessee who told the committee that the freedmen worked well for fair wages (see above, p. 79) described the poor <u>whites</u> in terms that were elsewhere applied only to the blacks:

> ...The poorer classes of whites are not getting along so well. They have no schools, and where they have no land they cannot get employment as readily as the colored men can. The richer men will not employ them, for the truth is, they are not as valuable for laboring as the negroes are. According to my judgement the poorer classes of white people, not only in Tennessee, but all over the south, are scarcely able to take care of themselves. They are inclined to be idle and lazy, and think it degrading to work [198].

Speaking directly to the issue of the "unwillingness of the negro to work," Col. E. Whittlesey, Assistant Commissioner of the Freedmen's

Bureau for North Carolina,was quite caustic:

> QUESTION. What can you say in relation to the negro's love of labor? Is he inclined to work for fair wages, or is he, generally, an idler and a shirk?
>
> ANSWER. I think that there is no more industrious class of people anywhere than the negroes of North Carolina when they have proper inducements held out to them. The idleness that has been witnessed during the last season was due in a great measure to the disturbed state of the community and to the uncertainty in their minds (an uncertainty very well founded, too) whether they would receive any pay at all for their work. I have heard no complaints of idleness or shirking in places where I have known that they were receiving fair and prompt payment for their work [199].

Samuel Thomas, Colonel and Assistant Commissioner of the Freedmen's Bureau in Mississippi and Northeast Louisiana, agreed in a letter to Carl Schurz:

> It is nonsense to talk so much about plans for getting the negroes to work. They do now, and always have done, all the physical labor of the south, and if treated as they should be by their government (which is so anxious to be magnanimous to the white people of this country, who never did work and never will), they will continue to do so. Who are the workmen in these fields? Who are hauling the cotton to market, driving hacks and drays in the cities, repairing streets and railroads, cutting timber, and in every place raising the hum of industry? The freedmen, not the rebel soldiery. The southern white men, true to their instincts and training, are going to Mexico or Brazil, or talk of importing labor in the shape of Coolies, Irishmen--anything--anything to avoid work, any way to keep from putting their own shoulders to the wheel [200].

Such favorable assessments of black productivity were not made only by sympathetic observers. A Southern writer described the changed race and labor relations prevailing in Georgia after the war this way:

> ...The confident prophecies of the croakers that Southern plantations would go to waste, and that nothing but ruin lay before us, have proved the merest bosh. The enormous increase in the cotton crop of the South alone shows that the colored people, as free laborers, have done well, for it is not to be

> disputed that they form very nearly the same proportion of the laborers in the cotton fields that they did when they were slaves...under no circumstances could worthless labor have produced the enormous increase in this crop [201].

This same Southerner went on to point out that the blacks did not live "in dread of the terrible Ku-klux," and that "Very many negro farmers are capable of directing the working of their own crops," without any white supervision [202]. James Runnion, in his Atlantic article on the "Exodus" movement of 1879, repeated the observation that Southern whites loathed work and that "It is certain that negro labor is the best the South can have, and equally certain that the climate and natural conditions of the South are better suited to the negro than any others on this continent" [203].

According to Vernon Wharton, "It also soon became apparent to those who gave the matter an actual trial that the freedmen in agriculture furnished a more satisfactory type of labor than could be obtained from white workers, either natives or immigrants." Wharton's conclusion was based on statements such as this "Sensible Communication" to the Raymond Gazette from a landowner near Terry, Mississippi, written in 1886:

> I do not...decry white labor, for I like it, when of the right kind, but if either must go, give me the nigger every time. The nigger will never "strike" as long as you give him plenty to eat and half clothe him: He will live on less and do more hard work, when properly managed, than any other class, or race of people. As Arp truthfully says "we can boss him" and that is what we southern folks like....I have worked both kinds of labor, side by side, with varying results. The nigger will do the most work and do it according to personal instructions....I record Experience against Theory [204].

In the 1890's, the Industrial Commission found planters satisfied with the quality and competence of black labor. J.H. Hale, who owned farms in both Georgia and Connecticut and who had direct experience with both northern and negro labor, was unstinting in his praise:

> ...I count that the Negro labor of the South is the best agricultural labor in America today. I will recommend them way ahead of our New England Yankee. The Yankee boys we think are perhaps a littler smarter for some expert work, but for agriculture throughout the year I think the negro labor of the South, at least the section where I am located, the Black Belt, is the best agricultural labor in America today, and I can accomplish more work for $1 in Georgia than I can for $3 in Connecticut, and get the same crop result....The extra advantage is in the efficiency and honesty of purpose and the faithfulness of the negro labor as compared with what we can get in Connecticut. I went South with the idea that the negro was a rather stupid creature and could be used only in the grossest lines of work, and I have learned different by using them for a number of years.... I do not know how the South could live without negro labor. It is the life of the South; it is the foundation of its prosperity; and the great future prosperity I see in the South, and believe in the South, is because they have such splendid labor and such good labor. God pity the day when the negroe leaves the South, or if they have to have labor from foreign countries to take the places of the negro [205].

Mr. Hale went on to explain that Negroes required no more supervision than northern workers, and that they were improving in efficiency. He closed his testimony on this subject by giving an example of the faithfulness of the blacks employed by him--they took care of his plantation and house while he was gone on trips, and voluntarily cut their wages when some of his orchard trees were killed by an unseasonable frost [206].

Not quite so enthusiastic as Mr. Hale was the Hon. Robert Ransom Poole, Commissioner of Agriculture of the State of Alabama, who

nevertheless testified that "If they [negroes] were as economical as the white people they would absolutely own that country in a few years. It is getting so that in our section in the black belt the most of the lands are rented to negro tenants for the simple reason that they can afford to give more for them than the white man can. I own several plantations and I rent to the negroes because I can get more rent from the negro" [207]. According to Mr. Poole, part of the reason for this was that Negroes did their own labor while whites hired it done [208], but if that were the case, either blacks were better workers, or the vaunted advantages of white supervision were illusory. It should be recalled from the earlier part of this section that another witness before the Commission saw "one of the causes of the depression in agriculture the presence of the negro," so that it would only be fair to say that the Commission was receiving mixed information. This ambivalence of the sources was quite common.

Perhaps the most persuasive arguments for the high quality of black labor after the war were those given by practical farmers in the Southern Cultivator. In an 1869 article, "What is the Proper Labor for the South," a "Subscriber" discussed the quality of black labor compared to the alternatives:

> ...Much has been said and written about the uncertainty and unreliability of free negro labor, and the necessity of superceding it by foreign white labor. To this end, Immigration Societies have been organized, to bring foreigners to take the place of the negro, in the cotton and rice fields of the South.
>
> At the risk of joining issue with many wise and good men, who really have the welfare of the country at heart, I venture to controvert the wisdom and propriety of this movement....
>
> . . . . . .

> He [the Negro] is already trained to the labor necessary for...production. He has his important part to perform in advancing the wealth and prosperity of the South. There is no adequate substitute for his labor. We have no faith in the availability of European emigrants, as a substitute for the negro, in the production of cotton....Is it not true that he [the Negro] has proved himself the most patient and enduring laborer that can be brought into the cotton and rice fields of the South? Shall we give him up merely because his bonds have been broken? Shall we cast away an inestimable boon, which God in his unerring wisdom had bestowed upon us, in the labor of the negro, because the relation of master and slave has been destroyed by Puritanical fanaticism [209]?

As is apparent even from the text quoted, "Subscriber " was no believer in black social or political equality. Nevertheless, he admitted "there is no adequate substitute for his labor." This opinion was shared by another writer in the same issue of the Cultivator. Even though Negro labor was "both uncertain and unreliable" and contracts with it were made at great disadvantage to the planter, "Negro labor is all we have at present, and is decidedly preferable to any we are ever likely to have--all emigration societies to the contrary, notwithstanding" [210]. Still another contributor held:

> I agree with Mr. Dickson as to the labor question. Let the Germans stay where they are. They will do very well in the grain region of the West, where they are hired by the day or week, and where such a thing as holding plow handles is out of date. There they jump into the seats of a Cultivator or mower and reaper, and drive "around" with a huge umbrella aboard if they wish, as if on a frolic. Just let him come down here, Mr. Editor, and try his hoe day after day in our "brilin sun," and he will heartily wish himself back in 'de farder land.' Give me cuffee, and I can give you cotton, There are no set of laborers on earth, save the sambo's, [sic] who can make a cotton and corn crop, on three pounds of bacon and a peck of meal per week. A German, on this diet would shrink up so promptly that a cut gourd vine would not even be a parallel [211].

As might be expected, some of the strongest assertions of the capability of black farmers and agricultural laborers are to be found in the pages of the Southern Workman. The Workman advanced two main arguments--first, that black labor was in no way inferior to white, and second, that free black labor was superior to slave labor both in productivity and profitability. A self-described "enemy of the Negro" writing "A Few Words on the Labor Question" in the Workman of 1875 observed:

> "Farming don't pay", has been a cant throughout the South since Lincoln's emancipation proclamation, and almost as universal has been the accusation, "our labor is too unreliable," meaning of course negro labor. Both observation and experience teach me that "white labor" is as unreliable as "negro labor" on the farm...the high priced lands of the North are no evidence of agricultural thrift. Those farmers live very well it is true, but they work much harder, and are more troubled with unreliable labor than we of the South. I have heard northern farmers say, time and again, that during their busiest season, they have today had all the "help" they wanted, and to-morrow it was gone [212].

The Workman did seem to be sensitive to the possibility that its statements might be interpreted as special pleading on behalf of the Southern blacks. At any rate, it frequently printed statements by anti-Negro Southern spokesmen as to the progress and productivity of the blacks. An 1877 issue reprinted an article from the Charleston News which argued that white immigrants failed to make a profit, whereas black workmen did:

> We are a "burnt child" on the question of immigration. We have tried white employees, beginning with the natives, and going all through the catalogue, even to those from the very back-doors of the Continent of Europe, and we are free to confess we have never found one that netted us a dime, while we know we made money out of Sambo, even though he persists in voting the Radical ticket.

> The principle we lay down is this: Any white man in this country who has attained to the age of maturity, and has never accumulated enough to buy him a home, will be more of a charge than a profit to me on my plantation. And this principle is adhered to because it is founded upon the experience of the past.
>
> Secondly, field hands coming from another country to the "Sunny South" bring with them no experience as to the cultivation of our crops, are not climatized, have less muscle and endurance under our climate than the negro, have far more wants, which require a cash capital that the Southern farmer has not; and for these reasons are less profitable, even with their superior energy, than the thriftless negro to whom we have all our life long been accustomed [213].

The height of irony was reached in reprinting a segment of an interview with none other than Jefferson Davis. Mr. Davis "spoke of the negro race in a rather patronizing way--as children, and not as men.... It was his opinion that, wherever the negro race was found, it must be as an inferior and servile race, and, in the long run, they would give way to the superior race under any and all circumstances." However, Davis acknowledged that he had

> ...changed his mind entirely upon one question, viz., that the great staples of the South, cotton and sugar, could be produced with greater economy and in greater abundance by paid labor rather than by the labor of slaves. He said to your correspondent: 'This has already been demonstrated, and that fact alone goes far to prove the advantage which the abolition of slavery has been to the whites' [214].

Three years previously a northern correspondent, "D.G.F." of Oswego, N.Y., related to the Workman a conversation he had had with a Texas gentleman during an extended train journey through the South. The Texas planter, who had lost 100 slaves by the Act of Emancipation, found that, after a period of transition,

> ...among these liberated people there were many, perhaps a majority, or more, who were industrious, economical, and

> naturally thrifty. Adapting themselves to circumstances they have bent their energies to improve their own condition and that of their race. As a result, many have already made large progress in education, many are now landowners, and on every hand unmistakable evidences are beginning to appear of prosperity and comfort. To the race, as a whole, freedom has already proved a blessing [215].

This planter also argued that emancipation had increased productivity in the South, because under the slave system, weight quotas for picking and workers' lack of any interest in the crop decreased both the quality and the quantity of the yield. He concluded that both whites and blacks had benefited from emancipation, even in those cases when whites were thrown back to reliance upon their own labor [216]. Finally, the 1878 New York Times article reprinted in the Workman, which was cited previously, concurred in the opinion that free labor was superior to slave. Noting that cotton output had increased and that planters were not as burdened by mortgage as they had been before Emancipation, the Times stated:

> ...That the emancipation of the slaves has been the first great cause of this result, there can be no doubt. The free colored man, having more self-respect, a greater feeling of responsibility, more knowledge, and from the necessities of the case being more industrious and faithful, is much more valuable as a laborer than was the negro slave. Unfortunately, there is a very large class of persons in the South who are not willing to acknowledge these facts, or who are so blinded by prejudice that they cannot regard them as do practical business men in other parts of the country [217].

Despite such reported improvements in the condition of freedmen, the Southern Workmen did not fail to take every opportunity to put forward its particular prescription for Southern black progress:

> When the war closed there were two sets of Radicals divided in opinion on Negro labor. One of them claimed, in their own peculiar phraseology, that "Free niggers would not work"; the other claimed that the colored man would

> labor as well as the white man, and compete successfuly with him in all branches of human effort. As usual, when extreme views are stated, there is some truth and some fallacy in both statements....If the negro be not so good a laborer as the white man, it is his misfortune, not his fault....During his enslavement the negro had no chance to learn to labor, although work was the only branch of education open to him. A man labors only when he puts forth an exertion in order to get something in return for it,--if a man put forth exertion through fear of punishment or through the compulsion of some other man, he is not a laborer, he is only a worker...if we would increase the usefulness of the negro to himself and to others, he must be educated [218].

This comparison of the respective qualities of black and white agricultural labor would not be complete without an inquiry into whether the levels of wages differed between the races. There is no doubt that some of the preference expressed by planters for black labor rested on the cheapness of that labor as compared with white [219]. What is surprising is the infrequent mention of such a discrepancy, and even some explicit statements that the pay of white and black workers was the same. It may be that planter spokesmen felt that the obvious did not need to be repeated, but there may actually have been no difference in remuneration for identical work. For example, not a single case of black and white sharecroppers in the same county receiving a different share of the crop was found.

One of the few systematic collections of wage data was in the Report of the Industrial Commission. As usual, the evidence is contradictory. The digest of testimony of volume VII of the Report summarized a preponderance of instances in which black mechanics were paid less than their white counterparts, although there were a few

cases of equal pay for equal work. Black tradesmen were generally thought to depress the wages of whites because "they can live on much less." But one witness believed that in places where the blacks were organized, their wages were the same as whites. This witness concluded,"For that reason the white mechanics of the South are assisting the colored men to organize" [220].

The picture is even more confused when attention is focused on agricultural labor. For farm workers, most Industrial Commission testimony indicated that blacks and whites received equal pay for equal work. Some witnesses were explicit:

> QUESTION: What is the difference between the competition of the white labor and black labor in South Carolina?
>
> ANSWER: The cotton is raised by colored people. The white people raise cotton in competition with the colored man and for the same work we do not pay any more. My whole place is arranged in so much for a day's work, and no matter who I have to plow I pay the same for the work. I have overseers and a colored foreman that I pay more [221].

Another Southern farmer testified that "The greater portion of our field labor comes from our colored population. About 20 per cent are white. All share alike. The contracts are made on the same basis to each race" [222]. On the other hand, another farmer told the Commission that the reason immigrants would not come to the South was that black labor was cheaper than any other type, with the possible exception of the Chinese [223].

In its over-all statistical summary of Southern wage levels, however, the Industrial Commission concluded that competition equalized wages for similar kinds of work, and that the only wage advantage

enjoyed by whites over blacks was due to their concentration in the more skilled trades:

> It would be desirable to show precisely the relative compensation of white and colored laborers. In these investigations it was not practicable to give averages by races. The returns were by counties, and averages of the whole body of laborers were calculated. As a very large proportion of them are of the colored race, especially in cotton-growing sections, and as any white labor of the same grade of service is leveled in the competition, a true average for exclusively colored labor would approximate these records of Southern labor, which by reason of higher pay of whites in a few more responsible positions would be somewhat higher than the average for the exclusively colored [224].

Other comparisons between black and white wages for similar work are few and far between, though there are other scattered indications that equal work received equal pay. In one unusual instance, the man who was Superintendent of the Texas Military Institute just after the war alleged that freedmen were actually contracting for higher wages than free whites, but this case was exceptional [225].

A.B. Hart wrote that whites and blacks were treated the same as laborers.

> ...Nowadays some Whites are tenants or laborers on large plantations. Near Monroe, Louisiana, for instance, is a plantation carried on by Acadians brought up from lower Louisiana, with the hope that they will like it and save money enough to buy up the land in small parcels. There are plantations on which white tenants come into houses just vacated by negro tenants, on the same term as the previous occupants; the women working in the fields, precisely as the Negroes do; there are plantations almost wholly manned by white tenants....
> . . . . . .
> Outside of the administrative force and their families there are commonly no white people on a cotton plantation. The occasional white hands make the same kind of contracts, live in the same houses, and accept the same conditions as the Negroes; but their number is small and they are likely to drift out either into cotton mills or into sawmills and timber work...[226].

Even after the Jim Crow movement was well under way, whites and blacks worked side by side on the same jobs, though there is no way of gauging how frequently or how amicably this took place [227]. One modern investigator found just after the civil war a rude equality extending down to overseers' treatment of black and white tenants alike [228].

Even from this brief survey it should be apparent that there was no clear pattern of agreement on the relative merits of black and white agricultural labor after the Civil War. If blacks were less productive, it was due to a "legacy of slavery" rather than to any intrinsic deficiencies. However, even given the undoubted oppressions and deprivations of slavery, there is still copious evidence that the black agricultural worker was the equal or superior of the white in the post-bellum years. As in the case of exploitation versus competition in the labor market, the anecdotal evidence is not sufficient to decide the question.

D. The Advantages and Disadvantages of Cotton Culture

The next major issue of the post-war Southern economy has to do with the complaint of "overspecialization" in cotton expressed by many agrarian reformers before 1900. These reformers advocated crop diversification to alleviate agricultural poverty and distress among both whites and blacks. By this point, it should be no surprise that the findings presented here will show that it is possible to support either the argument that cotton overproduction was the curse of the South, or that cotton was the most profitable crop available to the agricultural sector. While it is undeniably true that a host of critics and relatively impartial observers saw cotton culture as a source of low incomes and stagnation, it is also true that many similarly qualified commentators hailed cotton as the source of Southern wealth, not of its poverty.

"Overproduction" is a vague term, and in order to clarify its economic meaning, it is useful to summarize the main arguments that the South grew too much cotton:

(1) First, there were simple and unqualified statements that cotton was not profitable to grow. It is easy to find statements of this type in the agricultural magazines, but the actual reasons for the alleged unprofitability were usually either not specified or are among the subsequent items of this list.

(2) Farmers' speed of adjustment was too slow. That is, farmers displayed sluggish reactions to changes in prices or in other market signals. Sometimes this was combined with a notion that the farmers

knew how to grow only cotton, or would only grow cotton, no matter what its price. In any case, the causes of "overproduction" were farmers' irrationality and ignorance rather than any "external" agency.

(3) Cotton was overproduced because merchants and landlords insisted that their tenants grow cotton. Usually, the blame was laid at the door of the rural furnishing merchants. These merchants allegedly demanded that their tenants grow cotton because the cotton could not be eaten. Thus tenants had to buy all supplies at the country stores, at inflated prices and usurious rates of interest. Sometimes it was also argued that the merchants preferred cotton because of its salability. These arguments were variations on the theme that merchants forced farmers to grow cotton, in order to exploit them in the rural credit market. As a result, farmers were "locked in" to cotton culture.

(4) Related to these arguments, but on a larger scale, is the proposition that the South as a whole needed to diversify in order to escape its dependence on the rest of the country for food and other necessary supplies. Sometimes this is combined with a metaphysical argument that cash farming was somehow enervating, while agricultural self-sufficiency was enobling [229].

On the other side, the arguments that cotton deserved to remain "King" even after the war generally follow these lines:

(1) Simple statements that cotton was the best crop of the South, and that its production should be increased, not decreased. Often such

assertions were accompanied by crude projections of the world demand for cotton, which was undeniably increasing throughout the period.

(2) More sophisticated arguments purporting to show that the cotton had a comparative advantage in the South as against the alternative crops. These arguments were couched sometimes in terms or profitability, sometimes in terms of climate and physical conditions.

(3) Finally there is evidence that the farmers were price-responsive, economically rational decision-makers. Although not usually used to justify the cotton/non-cotton crop mix, these indications are contrary to the view that Southern farmers were ignorant, irrational, "traditional" agriculturists.

The same kinds of contradictory evidence on both sides of the overproduction question can be found, as in the previous cases of the two labor market hypotheses and the comparison of black and white agricultural labor. The form of the presentation on the cotton issue will be slightly different than in the two previous cases, however. Many of the pertinent statements on cotton culture contain the contradictory evidences side by side. Commentators were prone to conclude that diversification was indicated by the growth of cotton revenues, or that the suitability of Southern soils and climate created too great a temptation to specialize in cotton. For this reason, instead of presenting the arguments for overproduction first, and following them by the arguments for comparative advantage, both sides of the argument will be presented together. This format underscores the deep confusion of the 19th century analysts on this subject.

A good starting point for this discussion is the Southern Cultivator, the practical farmers' magazine which was accessible to most literate Southern farmers [230]. The question of overproduction was probably the greatest source of controversy in its pages. Most of the magazine every month was devoted to "tips" on various new techniques or agricultural experiments, but a huge number of letters and articles touched on the cotton issue.

The Cultivator's preoccupation with the overproduction debate even antedated the Civil War. In 1849, letters appeared advocating greater self-sufficiency, more working up of raw materials to be performed in the South itself, and investment in manufactures rather than in slaves [231]. An article later that year titled "Cotton--Too Much Planted" argued that "a less quantity would bring them more money," even though conceding that "this doctrine has and will be assailed by the great bulk of cotton planters, both by precept and example..."[232].

After the war, the controversy resumed. 1869 found David Dickson arguing both sides:

> Now we can purchase fifty million dollars worth of guano in its raw state, and clear one hundred millions of dollar on it in nine months, and expend nothing additional in manufacturing cotton and grain out of it--What say you to that? Are you not willing to have the money? I say let any foreigner have your dollars, when you can with certainty make two dollars in nine months, clear of cost, for every dollar spent.
>
> It is in every man's mouth, keep your money at home. That is impossible--money is not productive, unless kept moving. This is the point: keep your labor at home--manufacture everything at home that you can make to any advantage--spin your cotton and wool in Georgia, and convert it into cloth--work up raw hides into shoes--lumber into ships--wheat into flour--corn into bacon and lard--grass into beef, mutton and wool--iron ore into all manner of useful implements, &c., &c.,...[233].

Part of Dickson's inability to make up his mind may have been due to the fact that he was a fertilizer and cottonseed magnate in Sparta, Georgia [234], but the confusion extended far beyond him. The two opposing arguments ran parallel throughout the years of the '70's and '80's in the Cultivator [235].

In an 1869 article "What is the Proper Labor for the South," a "Subscriber" flatly stated "King Cotton re-asserts his power, and we who are to maintain him on the throne will see to it that we get our fair proportion of the benefits of his reign. Our redemption, under the favor of God, is in the cotton crop--out of it is to be realized the money power, the wealth of the South. By and through it we can and will control the commerce of this country" [236]. Not quite so vainglorious, but of the same mind, was "Panola," who argued that at current prices, cotton was simply more profitable than other crops, particularly corn:

> ...I say why plant an unremunerative corn crop, to be cultivated all the summer, and consumed in the cultivation of the succeeding cotton crop, when the same planter, with the same [labor] force, by leaving off the corn crop, can plant more cotton, and sow more largely of small grain, and finally put more money into his pocket, which is the gist of the thing at last [237]?

"Acorn" wrote that his high hopes for diversification had been dashed by the prevailing high cotton prices, so that "the hoary despot still sways his sceptre supremely," i.e., cotton remained King [238]. A Tennessee "Subscriber" made it clear that he did "not advocate the abandonment of the cultivation of cotton...it is eminently the crop of the South, but until we devote less of our land, time and attention

to the cultivation of cotton, and more to the cultivation of grain, grass and clover, and to the raising of stock, we can never be an independent and prosperous people" [239]. One "Random" of Egypt Station, Mississippi told the readers of the Cultivator that of all the possible food crops for the South, corn was too expensive because it "has second choice only of good land and good work," wheat was uncertain, and rye, oats, barley, and buckwheat had not been adopted in the South as staple breadstuffs [240]. Another contributor reiterated the profitability of cotton, while cautioning that other crops should be substituted for the "presumptuous little Cotton King" should the relative profitabilities of the crops change [241].

In 1872, the Cultivator reported extracts from an address by Gov. DuPont delivered at Tallahassee in December, 1871, in which the Governor advised that"...cotton be subordinated to the feed crops" because the extent of cotton planting precluded recovery of labor and other costs in cotton, and in order to avoid costs of transporting corn and meat from the Midwest [242]. Another writer in the same year urged diversification beyond both cotton and corn, to rejuvenate soil fertility and to decrease dependence on the North and West for other provisions [243].

In 1874, "Acorn" wrote again to the Cultivator bemoaning the overspecialization in cotton because of its great profitability!

> ...There is a fascination about cotton planting that seems irresistible--people all around us are drawn into the vortex; and we are very much to blame for it--for our papers and politicians are always blowing about the millions the cotton crop brings into Southern pockets. It is a mistake, and the sooner we realize it the better. The profits belong to others--the loss is ours [244].

"Acorn" probably believed that the farmers were not receiving the profits, which would be reason to switch crops if the returns to alternate crops could be retained, but he did not say why the farmers were unable to keep the cotton profits. The editors also reprinted an article from the N.Y. Financial Chronicle (date not given) which noted the profitability of cotton in no uncertain terms:

> We have extremely little faith in any falling off in acreage, except what actually is enforced, either by want of capital, or through bad weather in spring, preventing the putting in of seed, or some cause beyond the will of the planter.
>
> And the reason for this is evident--it lies in the fact that cotton always has paid better, and even since the war does pay better, than any other crop [245].

The Chronicle article went on to argue for diversification in any case, not because cotton is less profitable, but "to guard against unfavorable contingencies" [246].

The editors of the Cultivator began their 1874 volume with a denunciation of "money crops--cotton, as the representative of these, well-nigh absorbing the whole energy of our farmers" [247]. Perhaps more significant are repeated references to Grange advocacy of diversification, the first contained in the "Declaration of Principles" by the National Grange, adopted at St. Louis, February 11th, 1874, and reprinted in full in the April, 1874 issue of the Cultivator.

> We shall endeavor to advance our cause by laboring to accomplish the following objects:....
>
> . . . . . .
>
> To reduce our expenses, both individual and corporate; to buy less and produce more, in order to make our farms self-sustaining.
>
> To diversify our crops, and crop no more than we can cultivate....
>
> . . . . . .

In a similar tone, T.J. Smith, Master of the Georgia State Grange, addressed his Patrons in these words:

> ...let me earnestly and affectionately entreat you not to abandon the policy of making an abundance of supplies for home, and heed earnestly the resolution as passed by the Cotton States Convention of November last year, and impressively reiterated in its session of July last, of planting one-third of our arable land in small grain, one-third in corn and one-third in cotton.
>
> Hearken to the warning voice of the past whose syren [sic] song of planting all cotton, hurled us into bankruptcy of property and well might of credit and character...[249].

A "Cotton-Planting Granger" from Alexandria, Louisiana, wrote the Cultivator that despite fair crops and good prices after the war, "three-fourths of the cotton planters were broke" because they had borrowed money and planted cotton exclusively. According to this Granger,

> ...cotton planters should make cotton with their own money, and not with borrowed capital; otherwise they are the slaves of manufacturers, middle men and capitalists generally, when really they should hold the commanding position, and be independent of all such classes, which most assuredly would be the case, did they make cotton with their own means [250].

Another "Subscriber" depicted farmers' irrational predilection to plant cotton,in characteristically florid phrases:

> ...In spite of the rains and cold, people here have put forth every effort to plant a full crop of cotton--as fast as it died or was washed away, they replanted, until there was no seed left. They have fought hard for the "Old King," and whilst badly disappointed in the old gentleman, don't seem disposed to give up their allegiance yet. For--although judging in the future by the past,--he promises nothing but bankruptcy and ruin, they still rally under his time-honored banner, and persistently refuse to give up the fight.
>
> Cotton is emphatically, their King--and though he kicks and spurns them, they hail him their Chief, and will die like dogs, licking the hand that smites them. We glory in their spunk--but must confess, we fail to see good judgment in it [251].

In 1878 the same contradictory themes persist. One article claimed that a well-managed cotton farm on productive lands was capable of returning 30-50% on capital invested, provided that consumption expenditures (such as the purchases which made up most of the store account) were not counted as part of the cost of production [252]. Another, reprinted from Savannah News, provided the results of an experiment in which "broomsedge land" yielded a profit when planted in cotton, but not in corn [253]. On the other side, one contributor in that year repeated the argument, familiar by now, that diversification was necessary to achieve self-sufficiency [254], while another claimed that cotton production was no longer profitable in North Carolina, South Carolina, and Georgia [255].

The 1889 volume opened with the Cultivator's editorializing that money was not the proper objective of farming:

> What is the fundamental error of our system, the underlying cause of the depression which prevails so generally among the agricultural classes? It is the fashion to say that we plant too much cotton and produce too many bales. Another form of the same reply is, that we plant too little in grain and other provisions crops and buy too much from abroad. These are both correct in fact, but they do not go back to the root of the matter. These errors of detail are based upon a deeper lying, fundamental error--a misconception of the true business of a farmer....
>
> The average Southern farmer has been prone to consider the production of cotton, or sugar, or tobacco, or rice (according to locality) as the ultimate of his aims and efforts, and to look upon the production of food supplies, the care of live stock, and the minor industries of the farm, as so many drawbacks or hindrances--more or less necessary evils--to his full and abounding success....The farmer has been striving to recoup his losses, or build up a competence or a fortune by making money, and he is little inclined to produce anything that will not always command the cash.
>
> But the number is increasing of those farmers who believe that the essential of farming is to make a living on the farm...[256].

Other contributors continued the attack on overspecialization in cotton and the failure of farmers to achieve self-sufficiency [257]. Concentration on cotton was even satirized in an article contrasting Southern farming "Then and Now," in which specializing in cotton while purchasing "cheap" food and supplies from other regions was presumably ludicrous enough to discredit the "all-cotton plan" on its face [258].

Of greater interest, however, is an article devoted to "American Cotton" which argued simultaneously that the South enjoyed a world-wide comparative advantage in cotton culture, but that nevertheless diversification should be practiced.

> The true policy of the South is not to make less cotton, but to make it on less land, and therefore at less cost. It is the great money crop of the world. The American cotton is the one crop that can be shipped to all parts of the world. Wherever a bale of American cotton is turned out it will bring its value in gold. Our peculiar soil, and desirable climate together, give us an advantage over all other countries in producing it....
>
> . . . . . .
>
> The one thing now to be done in order to make the cotton producers the richest people in the world, is to bring their lands to the highest state of cultivation possible. To cultivate less land in cotton and to cultivate it better, and to put the balance of our lands in diversified crops [259].

The unnamed writer of this article must have implicitly held an unusual notion of the agricultural production function, because he did not advocate expansion of the labor devoted to cotton at the same time--the land planted in cotton was to be decreased. Such optimism about the unlimited productivity of the soil was not unknown in the Cultivator. This muddled reasoning went unchallenged, although a later article made the point that even though diversification might be desirable, "It

requires both time and money to convert a cotton plantation into a grain and stock farm" [260]. W.J. Northen even admonished the farmers of Georgia to use the profits from the exceptionally good cotton crop of 1889 to get themselves out of debt and finance a changeover to more diversified farming [261]! It is apparent that whatever view the Southern Cultivator's correspondents held on the relative profitability of cotton farming, they usually recommended diversification.

DeBow's also carried planter opinion in favor of diversification and self-sufficiency [262]. But consider the following passage:

> ...our soil and climate are pre-eminently adapted to the growth and cultivation of the cotton plant. Though this fact may be universally admitted, we would state in proof of it, that according to the census of 1860, the State of Mississippi produced that year one and a quarter million bales of cotton, it being more than one-fifth of the product of all the cotton States. This fact of itself is sufficient to prove that the soil and climate of Mississippi are both eminently adapted to the production of cotton. But while this is true, it is equally true that in the past years, for nearly one-third of a century, we may say from the year 1830, the cotton planters of the Southern States have given to the cultivation of cotton an undue and disproportionate, excessive degree of care, attention, labor, capital and breadth of land, to the exclusion of other crops, such as cereals, vegetables, fruits, hay and stock of every description, to the great detriment of themselves and the ruin of our country [263].

DeBow's did not recoil from an even more blatant non sequitur on this subject:

> The following is what the Commissioner of Agriculture says in his annual report, just out, on Southern agriculture: The continued high price of cotton has made its culture more profitable than at any former period, and the crop of 1868 has yielded a larger amount of money than that of 1859.
>
> I regret to observe, from official correspondence and during a brief tour through the cotton states, the tendency to neglect other crops and concentrate all available labor and capital upon a single product, however profitable. The inevitable result will be more cotton and smaller net returns

> after the purchase of needed supplies and, as a further result, a slower improvement of neglected lands. This bane of Southern agriculture is still operative, and may cease to exist only when low prices, disaster, and despondency shall again arrest the impolitic and irrational course of production. I would not advise an attempt to keep up prices by limiting the yield; a somewhat larger supply of the staple is needed in the markets of the world; the present rates cannot be sustained indefinitely; but I would not foster the suicidal mania for cheapening the money-producing crop while rendering dearer every other that must be purchased as an auxiliary of its production [264].

Other observers were not free of the inability to make up their minds about cotton's profitability. Henry W. Grady, writing in Harper's in 1881, felt that

> After sixteen years of trial, everything is yet indeterminate. And whether this staple is cultivated in the South as a profit or a passion, and whether it shall bring the South to independence or to beggary, are matters yet to be settled. Whether its culture shall result in a host of croppers without money or credit, appealing to the granaries of the West against famine, paying toll to usurers at home, and mortgaging their crops to speculators abroad even before it is planted--a planting oligarchy of money-lenders, who have usurped the land through foreclosure, and hold by the ever-growing margin between a grasping lender and an enforced borrower--or a prosperous self-respecting race of small farmers, cultivating their own resources, controlling their crops until they are sold, and independent alike of usurers and provision brokers--which of these shall be the outcome of cotton culture the future must determine [265].

Grady went on to argue half-heartedly for diversification:

> Those who have the nerve to give up part of their land and labor to the raising of their own supplies and stock have but little need of credit, and consequently seldom get into the hands of the usurers. But cotton is the money crop, and offers such flattering inducements that everything yields to that [266].

Successive articles in the anthology The South in the Building of the Nation held, first, that "over-production of cotton and failure to

raise the necessary food supplies on the plantation were the main causes for the depression, so far as it affected the Southern cotton growers" [267], and next, that USDA efforts to encourage diversification had failed because "the fact remains that the value per acre of the staples above mentioned [cotton, tobacco, rice and sugar] has been high compared with that of the cereals. The motive for keeping a large area in a single crop has been a strong one" [268].

Of course, not all sources are so conflicting. A.B. Hart evidently thought the South had a strong comparative advantage in cotton. "Since the South seems better fitted than any other part of the earth for the cultivation of cotton, since at any price about six cents a pound there is some profit in the business, and at the prices prevailing during the last five years a large profit, it seems certain that the Negro will be steadily desired as a cotton hand" [269]. "Nicholas Worth" in his autobiography expressed a similar opinion:

> It is a marvelous fact, unmatched anywhere under the sun, that these Southern states have a practical monopoly of one of the most valuable staple products of the earth. No other land has such an advantage. Wheat grows on our great prairies; it grows in many other countries also. So corn; so cattle; so wool; so even the minerals, gold and silver and copper. No one land has a monopoly even of tropical products. But the South is, and always will be, the great source of cotton [270].

The 1907 issue of The World's Work devoted entirely to the economy and investment prospects of the Southern states argued that the South exercised a practical monopoly in cotton production because that region's winters were cold enough to kill the pests that destroyed cotton, while its warm weather lasted long enough for a full growing

season. The tropical countries warm enough for cotton did not enjoy the cold months [271]. This same issue of World's Work included advertisements extolling the virtues of various cities and states of the South. Overproduction of cotton was not even hinted in one of these:

> It costs $25 a year to cultivate an acre of cotton. Poor farmers can raise 250 pounds to an acre which with the seed is worth at least $32 or a profit of $7 an acre. A good farmer will make a bale (500 lbs) to an acre or a profit or [sic] nearly $40 an acre and many make 1½ bales to an acre, or about $65 (allowing for increased cost of good cultivation), an acre profit. Compare this with the profits from wheat growing and remember that because there is more land than population you can buy the land for from $7 to $40 an acre. As one farmer said: "The most shiftless Negro can make a living growing cotton. There is no reason why an intelligent white man should not get rich at it." And they do...[272].

The Southern Workman advocated diversification, both to stay out of debt [273] and as behavior towards risk:

> All experience points to a diversified system as the really successful way of farming. Our Southern brethren have seen the folly of the one crop system, and are now raising their own grain, and it will not be long before they will be entirely independent. They will not rely on "King Cotton" any more. We have but little hope of the farmer who adheres, with such a tenacity to the one crop plan, never realizing that good time coming. Furthermore, we think the risk too great for a farmer to have all his capital in a crop of corn, wheat, oats, flax or grass, but should, as far as practicable, have a portion of his farm devoted to each. Then, should one crop fail, or the price thereof be low, he would not be among the sufferers from "hard times" [274].

The Workman also listed diversification as part of a 30-year program by which a man could start from scratch and become a prosperous farm owner [275].

Government reports and testimony taken by investigating committees were more confused. A Senate-sponsored inquiry into the causes of the agrarian distress of the early '90's concluded that overproduction, the failure to grow home supplies, speculation in cotton futures, and the demonetization of silver were the chief causes of the depression among the cotton farmers [276]. Regarding overproduction, the reasoning of the Committee was hardly razor sharp: "Overproduction in the sense that more cotton has been produced than can find an effective demand at fair prices, in the present condition of the finance and trade of the world, is undeniably true. Overproduction in the sense that the needs of the world for cotton and cotton manufactures have been more than met is denied" [277]. The Committee did acknowledge "...That considering our soil and climate, and the energy and industry and skill of our people, the American cotton raiser has the advantage over all others, and in the sharp competition in the future he will be the more successful." Nevertheless, the majority report recommended diversification to raise prices and escape the cotton credit system [278].

The Report of the Industrial Commission, if anything, leaned in the direction of finding cotton the most profitable Southern crop. In the "Topical Digest of the Evidence" of Volume X, the Commission admitted,"Diversification of agriculture [is] difficult in the Southern States," primarily because of Southern land's unsuitability for the alternative food crops, the high salability of cotton and the ease with which credit could be obtained against it. The Commission reported that witnesses advocated diversification nevertheless [279].

Examining the testimony itself, Mr. P.H. Lovejoy, a merchant and planter of Hawkinsville, Georgia testified:

> ...You can not jump right out of all cotton system and go into the other. They have not the means to do it with, and they must have help. The cotton crop is the only thing they can get ready money for in our section....We have no market for [corn and wheat and products of that kind]...and then they can not make enough corn and wheat there to the acre to make it interesting to go in it. Ten or 15 bushels of corn is a good crop in our country, That is the reason why we stick to cotton [280].

L.W. Youmans, a farmer and merchant of Fairfax, South Carolina, told the Commission that on the basis of experiment and "after mature reflection and an experience of 30 years, I thought the best promise would be in cotton." Youmans calculated that it was cheaper to buy some meat and horses from the West than to raise them at home, even though he did raise his own corn, forage, and bacon. He also found that "It is cheaper [i.e., more profitable] in my section to raise cotton than wheat," and his experimentation can be summed up by his response to a question on diversification: "If I thought I could diversify to my advantage, I would do so, but there is no crop there that I can plant with more certainty of coming out even [than cotton]" [281].

These examples could be multiplied [282]. How is it possible for such confusion to have existed? One explanation might be that the profitability of cotton versus alternative crops depended on the relative prices of the various crop outputs, and since these relative prices changed from year to year, assessments of profitability were bound to change. The references given above are not arranged chronologically, and many of them refer to different years. This objection does not

apply to the internally inconsistent statements, however. Even so, it requires a jump in reasoning to go from temporary fluctuations in price and profitability to the over-all conclusion that chronic "over-production" was a major source of distress. That leap consists of some sort of assertion that farmers were slow to react or incapable of reacting to changes in relative prices by changing their crop mix [283]. Two sources of farmers' rigidity are usually cited: either farmers' ignorance, sluggishness, or irrational predilection for cotton; or insistence on cotton culture by merchants and landlords as a way of locking tenants and other poor farmers into an exploitative credit system. As before, both support and contradiction of these can be found.

A classic description of the existence and consequences of a very low speed of adjustment was given by W.J. Northen in Southern Cultivator:

> At these highly remunerative [1867, 1868, and 1869 cotton] prices, farming in Georgia offered unusual inducements and magnificent possibilities. Everybody began farming and everybody planted cotton exclusively. The price dropped from these high points, yet never low enough to lose hope that it would rally again. Year after year the delusion has lasted, until multitudes of men, confronting the horrors of debt, have seemed utterly unable to tear themselves away from its constantly fastening power. This is the history, concisely told, of the depression in Georgia since the war so far as we are personally connected with it. Under the long-continued system of one crop and clean culture, our lands have been made barren, and many who came from the cities, under the delusion of fifty cents for cotton have abandoned us to our poverty and the fearful solution of our problem. To the towns and the cities, and away from the country and the farms, men and means, frightened as by a spectre, have been drifting, while debt, cruel and exacting, has wrung from us all but hope and honor. The country now languishes for the help that could easily make the wealth of the State...[284].

The economist Enoch M. Banks commented similarly in 1905:

> ...mortgages were made to secure debts; they were executed therefore only in those cases in which the debts lapsed. These cases were numerous, however, on account of the decline in the price of cotton from 1874 to 1898, and also on account of the slowness with which the farmers have been adjusting themselves in accordance with the best combination of the productive factors....
>
> . . . . . .
>
> ...The croppers do not as a rule make plans with reference to the future, and bend their energies toward the realization of those plans. They are content if they can make some arrangement whereby they may be enabled to get the bare necessaries of life throughout the year that immediately concerns them...[285].

Banks neglected to indicate whether the "decline in the price of cotton" was an absolute decline or a decline relative to the other relevant prices [286].

A more poetic expression of the same sort of farmers' ignorance and rigidity was given by "Nicholas Worth":

> The people,--the people of these fertile states,--a vast multitude, far apart as they dwell from another; pioneers yet (for the land is unsettled and their life is primitive and hard), but holding fast to the notion that they are a part of a long-settled life; fixed in their ways; unthinking and standing still; a grim multitude, though made up of jovial individuals; credulous of all old formulas and sayings, whether true or false, and incredulous of any new thing however obvious; sprawling in the sun of this happy climate; hungry without knowing it, and unaware of their own discomfort; ignorant of the world about them and of what invention, ingenuity, industry, and prosperity have brought to their fellows,...a stolid mystery these country people are in the mass [287].

At times these pessimistic evaluations of the adaptability of the Southern farmers had racial overtones:

> A remedy more and more looked to in all parts of the country is diversified or intensive farming. For this sort of farming the general opinion seems to be that the negro laborer is not suitable. Testimony as to his capability is not all one way, it is true....

> Others say, however, that the negro can raise cotton and nothing else; that he can not be trusted to care for stock; that he is unable to use farm machinery (as has been noted); that he will not give the attention necessary for diversified and intensive farming. It is said that any negro renter will not even cultivate his own garden patch to any great result in providing supplies for his family [288].

On the other hand, direct evidence of price-responsiveness of the Southern farmers is somewhat harder to find. It does exist, nonetheless. Robert Somers, an English traveler, observed in 1870-71 that

> The farmers of Tennessee have gone more extensively into the culture of cotton under the stimulus of high prices than was probably prudent, and Nashville of late years has been a brisk cotton market. The reduction of price this season will send many of the growers back to grain and stock, for which the soil and climate are well qualified. Yet the cultivators of the soil in Tennessee, as in other parts of America not supremely adapted by nature to the growth of any peculiar product for which there is a great demand in foreign markets, have difficulty in apportioning their crops, and are always ready to introduce or extend whatever promises a better return [289].

Somers was not sure these adjustments were a good thing, however:

> The old system of corn and cotton for ever on the same fields in uncertain proportions can no longer suffice to give a stable interest to the land; and if a large area and low price of cotton one year are followed by a small area and high price the next, and gambling in the cotton market is to be complicated by gambling in the growth of the staple, a most unfavorable blow will be given to cotton manufactures throughout the world [290].

An Alabama Commissioner of Agriculture in the '90's also had confidence in the long-term adaptability of the farmers in his state:

> ...After the increase in price of cotton directly after the war, every farmer went into raising cotton, thinking there was more money in the production of cotton than in other products, and neglected the raising of pork and corn; the decrease in the price of cotton forced them back to raise more corn, and now we are raising nearly all we consume in my State [291].

Possibly farmers' reactions to price changes were among those things too obvious to mention. Attention to the market is implicit in the arguments that cotton was the favorite crop because of its profitability, just as a low speed of adjustment was one of the reasons advanced for "overproduction." Certainly DeBow's and Southern Cultivator discussed farming techniques and economics endlessly, which indicates at least that readers of those magazines kept track of the economic situation. The incessant debates over diversification, crop rotation schemes, and the results of agricultural experiments throws doubt on the idea that Southern agriculture was cast into a "traditional" mold and was carried on in a spirit of not-so-blissful oblivion. And the demand for publications of the agricultural experimental stations, as well as subscriptions to the agricultural papers of the South, was rising, increasing several hundred percent in the first decade of the 20th century [292].

The other agency blamed for overproduction of cotton was the Southern credit system, particularly furnishing merchants' insistence that farmers borrowing from them concentrate on cotton. The merchants' predilection for cotton was usually explained in terms of the low risk and salability of the cotton crop, the merchants' need for a cash crop to enable them to satisfy their creditors, or their desire to have the farmers indebted to them cultivating a crop which couldn't be eaten, so that the farmers would be forced to purchase all food and supplies from the merchant. Usually a connection was made between farmers' being exploited and their being "locked in" to cotton production. This argument has been developed in its greatest sophistication by Richard Sutch

and Roger Ransom of the Southern Economic History Project of the University of California in Berkeley [293].

Two issues need to be separated. The first is whether the furnishing merchant was "a monopolist in a limited local market" [294]. Whether or not the merchants actually exploited farmer-consumers remains an open question, and will not be settled here. The second question is whether the merchants in fact preferred cotton, and if they did, whether they insisted on cotton culture to the detriment of the farmers and tenants who did business at their stores. In other words, was it true, as Sutch and Ransom argue, that "The merchant's insistence on cotton and his monopoly of credit may have prevented the smaller farmers from diversifying even if it was in their own interest to do so" [295]?

The difference between these two questions needs to be made clear, especially since it seems to have eluded almost every writer on the subject. Suppose, for purposes of argument, that the merchant actually did possess a credit monopoly in relation to the farmers in his area. This monopoly could have been due to spatial factors, barriers to entry, or the absence of alternative credit institutions [296]. Suppose further that because of relative prices or physical (soil and climatic) conditions, corn was the most profitable crop that could be grown by the farmers in that area. Would the merchant insist on cotton? Clearly not, if he truly possessed a credit monopoly. Corn was not the only commodity required by a farming family as working capital--they also needed clothing, seed, fertilizers, implements, notions; in

short, all those necessities which could not be produced on the farm. If the merchant possessed a true credit monopoly, why would he not be able to realize his full monopoly profits from sales of those commodities which the farmer still was forced to buy from the merchant, excluding corn? Could the merchant not charge an exorbitant (monopoly) price for salt? Or clothing? Or harnesses? Only if the "monopoly" had consisted of a fixed markup would merchants' profits depend on the volume of business transacted in his store, and only in this case would the "inedibility" of cotton recommend it to merchant preference. But such a situation is not a true credit monopoly. If the merchant possessed a monopoly claim to a portion of the farmer's income,due to the farmer's dependence on the merchant for credit and necessities not produced on the farm, the limit to the merchant's return would have been how much the tenant or farmer could bear to pay without moving away or revolting, not the volume of business transacted at the store. If corn were more profitable than cotton, monopolist merchants would have insisted that their debtors grow corn, in order to maximize profits. Obviously, the same argument applies to whatever the most profitable crop mix actually was.

The absurdity of the "inedibility" argument for cotton has been recognized by a careful traditional historian of the Southern country store:

> The argument, which has been advanced on numerous occasions that one main reason for cotton's becoming a staple crop in the post-war South was its inedibility, would seem to be wholly fallacious. Certainly no merchant ever hinted at such a thing in an interview with the author, and no such implication appears

> in the mercantile records examined. Instead, many merchants have been known to advise customers to plant more food and feed crops in order to leave more of their cotton money clear....To argue that the inedibility of cotton was an important factor in production is ridiculous in the light of the fact that clothing was practically as much a matter of primary concern as food. In most communities of the post-war South spinning wheels and looms were not wholly unknown, and it was just as possible to lose money on cotton used for home consumption in the manufacture of clothing as it was on edible products. The whole point in the furnishing trade was profit, and an intensive examination of invoice and account books indicates that perhaps a greater profit was to be made in the sale of clothing and notions than in provisions. [Emphasis added] [297].

Clark continued that low risk and high liquidity were incentives favoring cotton culture [298], but these would not necessarily imply a conflict of interest between merchant and farmer. A merchant who perceived that the greatest potential agricultural profits lay in raising cotton would be inclined to recommend or insist that his debtors cultivate the staple, regardless of any monopoly advantage he might have. Concentration on the most profitable crop would benefit both merchant and tenant.

Analogously, the preference of landlords for cotton or for alternative cops would seem to depend primarily on the relative profitability or productivity of the various crops, whatever the landlord's market position vis à vis the farmers or tenants.

Only the questions of the relative profitability of cotton as against alternative crops, and of the farmers' price-responsiveness, can be settled using the techniques of the subsequent chapters. The quantitative investigation required to determine the market position of the furnishing merchants awaits future investigators. Farmers' adaptability

has already been discussed. As in all the previous cases, it is possible to uncover conflicting evidence on (1) whether or not country merchants and Southern landlords actually did insist on cotton and prohibit diversification, and (2) whether the merchants were monopolists or whether they charged competitive market prices. Because the monopoly position of the merchants will not be determined in this study, only evidence pertaining to (1) will be presented.

One of the most persistent proponents of the view that merchants insisted on cotton culture was the economist Matthew B. Hammond. He consistently argued that merchants distorted the crop-choice decision to the detriment of the farmers.

> A still greater hindrance to the improvement of the farming system of the cotton belt was the credit system which had arisen, and which gave the merchants the power of deciding what crop should be planted, regardless of their effects upon the land, or their value to the producer [299].

Elsewhere, Hammond said that

> ...Unfortunately, there were few of the cotton growers who were in a position to change from cotton to other crops.... The only security which the tenant farmer could give to the country merchant who advanced him his food, clothing and other necessities, was a mortage on his crops and as cotton, because of its ready sale, was much to be preferred to other crops, the merchant was obliged to demand it as security for his advances. This preference shown to cotton by the advancing merchant led to its over-production and consequent fall in price....Escape from this vicious circle proved impossible for most of the negro croppers and some of the white ones, and "the cropping system" and the system of "crop-liens" thus worked conjointly in causing over-production of cotton and agricultural depression in the South [300].

In the Industrial Commission's summary of testimony concerning crop lines, the same theory was advanced:

> ...it is a general custom of cotton planters and their tenants to use their credit with the neighboring merchants to obtain their plantation and family supplies in advance of the maturing of the crop, often even before the seed is planted. The farmer estimates about how much credit he wants, and the merchant tells him to produce so many acres of cotton, allowing a good margin against a possible crop failure.... It is a direct cause of the enormous production of cotton, with a constant tendency toward overproduction, and of the low price of cotton....The store system of the South amounts to a sort of peonage with the cotton planter. The rate of interest on the liens of cotton crops averages at least 40 per cent a year, and the planters are at least a year behind [301].

The Industrial Commission's summary also blamed an overextension of credit encouraged by the crop lien as a source of distress, but observed at the same time that the merchants did not prosper under the system, because of the high risks involved: "Merchants are not prosperous when the farmers are not, because they lose so much on their advances" [302].

The Congressional Report on the Condition of Cotton Growers reported the most extreme statement of the inedibility argument. Major W.H. Morgan, a planter of LeFlore County, Mississippi, informed the investigators:

> In short, I would say that it only pays to raise cotton in order to have a market at home for what you raise other than cotton. Your tenants or farm laborers are your patrons, and just so far as you can make them so, you are successful [303].

Needless to say, Major Morgan sold supplies to his tenants and laborers, doubling as both landlord and furnishing merchant [304].

None of these statements is surprising, in light of the general acceptance of the merchants' preference for cotton by almost all modern historians. What may be surprising is that tenant diversifiers found support among the economically powerful classes. Some landlords not only permitted, but even encouraged, self-sufficiency on their plantations.

There is strong evidence that the "garden patch" was an integral part of the small post-war farm.

> In all cases the planter furnished a dwelling-house free, wood and water (paid for by digging wells), and pasture for the pigs and cows of the tenant. In all cases the renter had a plot of ground from one to three acres, rent free, for a vegetable garden or "truck patch." Here could be raised watermelons, sugar-cane, potatoes, sorghum, cabbage, and other vegetables. Besides his pigs and cows, every tenant could keep chickens, turkeys, and guineas, and especially dogs, and could hunt in all the woods around and fish in all the waters [305].

Naturally, landlords' encouragement of the garden patch would tend to weaken any "lock-in" desired by merchants. Tenant farmers may have been economically helpless, but landholding planters were surely not. The Southern Cultivator also reported some instances of planters permitting tenants gardening. In an article praising the agricultural practices on the South Carolina plantation of Capt. W. Miles Hazzard, the Cultivator presented a long list of recommendations for dealing with free labor. Among the suggestions were

> 10. To every household a garden spot is allotted: and to each laborer a portion of rice land--to full hands one acre, and to others in proportion....
> . . . . . .
> 12. They [the laborers] are allowed to keep a reasonable number of hogs, and to raise poultry ad libitum [306].

Capt. Hazzard's plantation also included a store "where abundant and diversified supplies are kept," and the Cultivator reported that supplies were "sold to the laborers at the lowest cash prices, taking their due bills in payment" [307]. Of course, this situation may have prevailed only until the planter/merchant learned the profits to be made in exploiting his laborers. But an article reprinted in the Cultivator

from Southern Plantation in 1878 reported similarly a planter who "allows them [his employees] a certain amount of land to cultivate for themselves and in their own way" [308]. Perhaps the most remarkable instance of the active promotion of self-sufficiency among tenants by a large Southern landowner is to be found in the Appendix of Timothy T. Fortune's polemical Black and White. Fortune appended the testimony of Mr. John Caldwell Calhoun before the Blair Senate Committee on Education and Labor taken in New York in September of 1883, "because of the uniform fairness with which he treated the race and labor problem in the section of the country where he is an extensive landowner and employer of labor" [309]. John Caldwell Calhoun may have been a progressive planter, but he was surely no upstart, being the grandson of John C. Calhoun of South Carolina [310] and a man who, in his own words, had "been identified with the agricultural interest of the South from my earliest recollections, and...a practical cotton planter myself since the war, giving my own personal attention to my interests since 1869" [311].

Mr. Calhoun furnished his field hands

> ...free of cost, a house, fuel, and a garden spot varying from half to one acre; also the use of wagon and team with which to haul their fuel and supplies, and pasturage, where they have cattle and hogs, which they are encouraged to raise [312].

Calhoun continued:

> ...We encourage him in every way in our power to be economical, industrious, and prudent, to surround his home with comforts, to plant an orchard and garden, and to raise his own meat, and to keep his own cows, for which he has free pasturage. Our object is to attach him as much as possible to his home. Under whatever system we work, we require the laborer to plant a part

> of his land in food crops and the balance in cotton with which to pay his rent and give him ready money. We consider this system as best calculated to advance him....
> . . . . . .
> We have our own gardens, and generally raise our own supplies, but every planter interests himself to find a market for all the products of his laborers. For instance, we encourage them to raise poultry to a great extent. If they have a surplus of potatoes, or eggs, or chickens, we will buy it and create a market for it, and ship the articles off in order that if they have any surplus they may realize on it. On the Mississippi River we have nearly all the markets. We make the best market we can for the products of our small farmers [313].

Calhoun also stated that in the interior of his own state of Arkansas, the small farmers were more diversified, and that his own plantation practiced diversification "in case of disaster to our cotton crops" [314].

These examples show that at least some landlords encouraged their tenants' self-sufficiency early in the post-war period. It does seem that it would have been rational for landlords operating farms on shares to maximize output. All this indicates (if such an indication were still needed) the danger of generalizing from anecdotal evidence. It is not the contention here that some merchants did not prefer cotton; only (a) that elements of one center of economic power, the planters, were not entirely opposed to diversification, and (b) that even if the merchants were monopolists exploiting the farmers who borrowed from them, it does not necessarily follow that farmers had to be "locked in" to cotton culture.

Again, it should be emphasized that the monopoly power of the merchants cannot be determined on the basis of either the literary evidence or the econometric estimates of the later chapters. The abundance

of conflicting testimony precludes any definitive assessment of the "merchant monopoly hypothesis" on the basis of anecdotes or single instances alone. Furthermore, it will be shown in the next chapter that the future presumption must be in favor of the Competition Hypothesis with respect to the labor market, despite the array of individual incidents of exploitation which can be compiled. This finding suggests caution in accepting any generalization regarding market imperfections in the post-bellum South. In any case, the question of merchant monopoly power must be kept distinct from the preference of merchants or farmers for cotton or other crops.

E. Summary

The result of this none-too-systematic survey of the 19th centry sources is in the form of an "impossibility theorem." Traditional historical methods simply cannot resolve the post-bellum Southern agricultural system sufficiently to distinguish which of the major alternative hypotheseswere true in the aggregate. The extraordinary political and social tensions of that region may have had their origins in exploitation of agricultural labor and of the blacks in particular, but a search of the sources will never be able to determine if the documented instances of exploitation were general or exceptional. Similarly, the poverty of the black population may have been due to educational and entrepreneurial deficiencies rooted in the slavery experience, but conventional methods are incapable of even determining whether the blacks as a group were less productive than whites as a group. Cotton overproduction and farmers' traditionalism may have caused stagnation in the economy and contributed to the agrarian unrest of the '80's and '90's, but equally possible (on the basis of the statements of contemporary observers) is that the South's suitability for cotton culture was the main pillar of whatever prosperity its people were able to enjoy. Clearly, if further progress is to be made towards understanding these historical problems, more powerful techniques must be developed and applied. That endeavor constitutes the remainder of this investigation.

NOTES TO CHAPTER II

[1] For a full account of Andrew Johnson's plans for reconstruction, see Eric L. McKitrick, Andrew Johnson and Reconstruction (Chicago: University of Chicago Press, 1960).

[2] Ibid., 169.

[3] Kenneth M. Stampp, The Era of Reconstruction: 1865-1877 (New York: Vintage Books, a Division of Random House, 1965. First Vintage Books Edition, September, 1967.), 80.

[4] Edward McPherson, The Political History of the United States of America During the Period of Reconstruction, from April 15, 1865 to July 15, 1870 (Washington, D.C.: Philp and Solomons, 1871), 30. This source collection contains a compilation of the codes themselves, so the quotations are from the actual statutes.

[5] Ibid., 33.

[6] Ibid., 36.

[7] Ibid., 40.

[8] Ibid., 39.

[9] Ibid., 31.

[10] Ibid., 43.

[11] Ibid., 36.

[12] Ibid., 29-30.

[13] Ibid., 36.

[14] Ibid., 29.

[15] Ibid., 43.

[16] Ibid., 30.

[17] Ibid., 34.

[18] Ibid., 40.

[19] Ibid., 39.

[20] For a brief account of the repudiation of these governments, see Stampp, Era of Reconstruction, 144-145.

[21] McPherson, Political History, 42.

[22] Ibid., 36-37.

[23] George Ruble Woolfolk, The Cotton Regency: The Northern Merchants and Reconstruction, 1865-1880 (New York, Bookman Associates, 1958), 48-29. The letter referred to is cited by Woolfolk as William King to Maj. General O.O. Howard, Savannah, Georgia, 30 May, 1865. Woolfolk's reference states, "This letter, with the original planter's plan and the revisions after King's New England Conference (to be found in the appendix), were located in the Freedmen's Bureau MSS., War Department Archives, the National Archives, Washington, D.C." (Woolfolk, Cotton Regency, 210). The letter will subsequently be referred to as the King Letter.

[24] King Letter, cited in Woolfolk, Cotton Regency, 71.

[25] King Letter, cited in Woolfolk, Cotton Regency, 72.

[26] King Letter, cited in Woolfolk, Cotton Regency, 72-73.

[27] U.S. Congress, Joint Committee on Reconstruction, Report of the Joint Committee on Reconstruction, 39th Cong., 1st Sess. (Washington: Government Printing Office, 1866), Part III, p. 25. This report will hereafter be referred to as the RJCR.

[28] C.W. Tebeau, "Some Aspects of Planter-Freedman Relations, 1865-1880," Journal of Negro History, XXI, No. 2 (April, 1936), 143-144. Tebeau cites Senate Executive Document, No. 6, 36 Cong., 2 Sess. 141; and House Executive Document, No. 70, 39 Cong., 1 Sess., 93-4 for this remarkable fact.

[29] "H.," "Letter from Mississippi," Southern Cultivator (Augusta, Georgia), XXVII (June, 1869), 181.

[30] "Cotton Trade of the World," DeBow's Review (July, 1896), 610. The copies of DeBow's Review which were accessible to this writer were missing the covers, where series, volume and number were normally given. Hence, in this and future references to DeBow's, only the date will be given. This famous magazine appeared monthly, so no confusion should result from this abbreviated reference form.

[31] Ibid., 609.

[32] Carl Schurz, Report on the Condition of the South (New York: Arno Press and The New York Times, 1969), 16-17. This Report was submitted by Schurz on December 19, 1865, and originally appeared as U.S. Senate Ex. Doc. No. 2, 39th Cong., 1st Sess. The Arno Press Reprint referred to here is an exact photographic reproduction of the original Report, and will be referred to hereafter as the Schurz Report.

[33] Schurz, Report, 74.

[34] Ibid., 73. This letter was from Capt. Poillon to Gen. Carl Schurz, dated 9 September, 1865, from Mobile, Alabama.

[35] Schurz, Report, 23-24.

[36] Ibid., 32.

[37] Ibid., 84.

[38] Ibid., 86.

[39] RJCR, i.

[40] Stampp, Era of Reconstruction, 110.

[41] RJCR, Part II, 56.

[42] RJCR, Part III, 27.

[43] RJCR, Part III, 31.

[44] See, for example, the testimony of Brigadier General Charles H. Howard, Inspector in the Freedmen's Bureau and brother of Major General O.O. Howard, Chief of the Freedmen's Bureau, RJCR, Part III, 36; also the testimony of Brigadier General James S. Brisbin, U.S. Army Captain stationed in Arkansas, RJCR, Part III, 70; and the testimony of Thomas Conway, Assistant Commissioner of the Freedmen's Bureau in New Orleans, who testified that in effect the Louisiana Black Codes simply substituted the word "negro" for the word "slave" wherever it appeared, RJCR, Part IV, 79.

[45] RJCR, Part II, 54-55.

[46] RJCR, Part III, 142.

[47] RJCR, Part IV, 39.

[48] RJCR, Part III, 30.

[49] RJCR, Part III, 27.

[50] RJCR, Part I, 107-108.

[51] "Treatment and Pay of the Freedmen," DeBow's Review (February, 1868), 213.

[52] "How They are Settling the Labor Question in Mississippi," DeBow's Review (February, 1868), 224.

[53] Oscar Zeichner, "The Legal Status of the Agricultural Laborer in the South," Political Science Quarterly, LV, No. 3 (September, 1940), 428.

[54] Ibid., 424. Zeichner's notes are
*North Carolina Code (1935), §4281, and
**North Carolina Code (1935), §4481.

[55] Zeichner, "The Legal Status...," 423-424, fn. 33.

[56] Ibid., 425, fn. 38. Zeichner's reference is to Bailey v. Alabama, 219 U.S. 245(1911).

[57] Zeichner, "The Legal Status...," 425.

[58] Ibid., 426-427. Zeichner's references are
* Ala. Code (1928), §696, 197, 3980.
** Miss. Code (1930), Supplement, Appendix, p. 442.
*** Ga. Code (1933), sec. 92-506; see also sec. 54-9902.
**** S.C. Code (1932), §1377, 1378.
***** For further reference, see S.M. Harrison, Public Employment Offices (New York: 1924), p. 606, and R.S. Baker, Following the Color Line (New York: 1908), pp. 79-80.

[59] Zeichner, "The Legal Status...," 427-428, including fns. 48-54 for State Code references.

[60] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. XI: Report of the Industrial Commission on Agriculture and Taxation in Various States (Washington: Government Printing Office, 1901), ii. Hereafter referred to as ROIC, XI.

[61] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. V: Report of the Industrial Commission on Labor Legislation (Washington: Government Printing Office, 1900), 74-77. Hereafter referred to as ROIC, V.

[62] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. X: Report of the Industrial Commission on Agriculture and Agricultural Labor (Washington: Government Printing Office, 1901), 416-421, passim. Hereafter this volume of the Industrial Commission's Reports will be referred to as ROIC, X. The quotations here are all from the testimony before the Industrial Commission of the Hon. George Henry White, the only black man in Congress at that time, representing the Second District of North Carolina.

[63] It should be noted that this can be taken as evidence either for the legal embodiment of market power of landlords, or as the legal destruction of such power. Which proved ultimately the more effective: the operation of the laws while they were in force, or the striking down of the laws? There is no way to determine this from the legal history alone.

[64] Charles S. Mangum, Jr., The Legal Status of the Negro (Chapel Hill: University of North Carolina Press, 1940), 165. The Florida reference is to In re Peonage Charge, 138 Fed. 686 (C.C.N.C. Fla. 1905). The other references are to *United States v. Clement, 171 Fed. 974 (D.S.C. 1909), and **Peonage Cases, 123 Fed. 671 (M.D. Ala. 1903).

[65] Mangum, The Legal Status of the Negro, 172.

[66] Albert Bushnell Hart, The Southern South (New York and London: D. Appleton & Company, 1910), 3.

[67] Ibid., 278.

[68] Ibid., 261.

[69] Ibid., 280.

[70] Ibid.

[71] Ibid., 284.

[72] Ibid., 284-285.

[73] Nicholas Worth (pseud.), "Autobiography of a Southerner," Atlantic Monthly, XCVIII, Nos. 1-4 (1906), 486.

[74] Ernest Hamlin Abbott, "The South and the Negro," The Outlook, Vol. 77 (May 28, 1904), 226. "The South and the Negro" was a seven-part serialized article beginning in the May 21, 1904 issue of The Outlook.

[75] Ibid. (July 23, 1904), 692.

[76] James B. Runnion, "The Negro Exodus," Atlantic Monthly, Vol. XLIV, No. CCLXII (August, 1879), 230.

[77] "Exodus Notes," Southern Workman, VIII (Oct. 1879), 102.

[78] Southern Cultivator, XXVII (May, 1869), 149.

[79] Alabama [pseud.], "What is Our Interest," ibid. (October, 1869), 312.

[80] C.M. Vaiden, "Agricultural Association," ibid. (September, 1869), 275.

[81] "State Agricultural Society," The Southern Cultivator and Dixie Farmer (formerly Southern Cultivator), XLVII (Aug. 1889), 394.

[82] Northen is referred to as the "ex-governor of Georgia" in The Crisis, IV, No. 1 (May, 1912), 17.

[83] Southern Cultivator and Dixie Farmer, XLVII (Jan., 1889), 20-21.

[84] "Organization Among Farmers," ibid. (Feb., 1889), 88.

[85] The text of this Circular, dated Sept. 8, 1892, is from the Watson MSS., cited by C. Vann Woodward, Tom Watson: Agrarian Rebel (New York: Oxford University Press, 1963; first published by the Macmillan Company, 1938), 236.

[86] William O. Scroggs, "Convict and Apprenticed Labor in the South," The South in the Building of the Nation, Vol. VI, prepared by The Southern Historical Publication Society (Richmond: 1909), 48. This volume will hereafter be referred to SBN, VI.

[87] Hart, Southern South, 200-202.

[88] Ibid.

[89] Ibid., 286-87.

[90] ROIC, V, 202-4.

[91] Alexander's Magazine, I, No. 11 (March, 1906), 18.

[92] According to C. Vann Woodward, "The Southern Workman (Hampton, Va., 1872-1939) was the organ of the Hampton-Tuskegee school of race and labor philosophy." "Critical Essay on the Authorities," Origins of the New South: 1877-1913, Vol. IX of A History of the South, edited by Wendell Holmes Stephenson and E. Merton Coulter (Baton Rouge: Louisiana State University Press, 1951), 499.

[93] Argus [pseud.], "Protect Yourselves," originally appearing in the black newspaper The People's Advocate (n.d., n.p.) and reprinted in Southern Workman, XIII (Jan. 1884), 5.

[94] "Two Sorts of Southern Sentiments," Southern Workman, V (May, 1876), 38.

[95] Southern Workman, VII (Feb. 1878), 11.

[96] Ibid.

[97] W.N.A.[W.N. Armstrong?], "About Emigration," ibid., IX (Feb. 1880), 15-6.

[98] Ibid., XV (Aug. 1886), 87.

[99] This description was applied by James M. McPherson in his Introduction to the Arno Press reprint edition of Timothy Thomas Fortune, Black and White: Land, Labor and Politics in the South (New York: Fords, Howard and Hulbert, 1884. Reprinted New York: Arno Press and the New York Times, 1968), i.

[100] James McPherson, Introduction to Black and White..., ii.

[101] Fortune, Black and White..., 151.

[102] Ibid., 150.

[103] Ibid., 232.

[104] James McPherson, Introduction to Black and White..., i.

[105] "The Negro Press," Southern Workman, XIX (Feb. 1890), 15. The speech was quoted from the Washington Bee, n.d.

[106] William A. Sinclair, Aftermath of Slavery (Boston: Small, Maynard & Company, 1905), ix-x.

[107] Sinclair, Aftermath of Slavery, 223-224.

[108] Ibid., 224-27, passim.

[109] This entire passage is based on the account of an anonymous freedman, reproduced in Sinclair, Aftermath of Slavery, 229-32. The freedman's story was first reported in the New York Independent. Unfortunately, Sinclair gives no date or other reference to the Independent.

[110] "Crime," The Crisis, IV, No. 4 (August, 1912), 167.

[111] "The Burden," ibid., III, No. 5 (March, 1912), 209.

[112] Ibid., IV, No. 1 (May, 1912), 39.

[113] Philip A. Bruce, The Plantation Negro as Freeman (New York and London: G.P. Putnam's Sons, The Knickerbocker Press, 1889), 177-8.

[114] Schurz, Report, 15.

[115] Ibid., 28.

[116] RJCR, Part I, 109.

[117] RJCR, Part I, 117.

[118] RJCR, Part III, 70.

[119] RJCR, Part III, 167.

[120] RJCR, Part II, 77.

[121] RJCR, Part III, 65.

[122] RJCR, Part III, 99.

[123] John Cornelius Englesman, "The Freedmen's Bureau in Louisiana," The Louisiana Historical Quarterly, Jan. 1949, Vol. 32, No. 1, 185. Englesman cited the Truman Report in Senate Executive Documents, 39 Cong., 1 Sess., No. 43, p. 89. The incident referred to took place during 1866.

[124] Southerner [pseud.], "Agricultural Labor at the South," The Galaxy, Vol. 12, No. 3 (Sept. 1871), 329, 332, 334, 337, and 339.

[125] Ibid., 335.

[126] DeBow's Review (Sept. 1869), 787-88.

[127] William M. Burwell, "Science and the Mechanic Arts Against Coolies," ibid. (July, 1869), 564-65.

[128] J.C. Delavigne, "The Labor Question," ibid. (Feb. 1870), 168-9.

[129] "Grain and Stock vs. Cotton Culture," Southern Cultivator, XXVII (July, 1869), 214.

[130] Agricola [pseud.], "The Labor Question," ibid., 207.

[131] J. Dickson Smith, "Revolution in Southern Agriculture," ibid. (February, 1869), 53.

[132] Acorn [pseud.], "Diversity of crops, &c," ibid. (June, 1869), 174.

[133] "Immigration," ibid. (Dec. 1869), 372-3.

[134] "Coronation Ode," ibid., XXXII (July, 1874), 291.

[135] A.R. Lightfoot, "Condition and Wants of the Cotton Raising States," DeBow's Review (Feb. 1869), 153.

[136] Ibid.

[137] Marjorie S. Mendenhall, "The Rise of Southern Tenancy," Yale Review, Vol. 27, No. 1 (Autumn, 1937), 126. Unfortunately, Ms. Mendenhall cites no source for Harry Hammond's observation. It should also be pointed out that she does not specify whether the final sharecrop arrangement in this instance (with 3/4 of the crop going to the

tenant) was based on the tenant's provision of animals, fertilizer, and other capital. On the same page of her article, Mendenhall observes that "The model of contracting preferred in South Carolina...required the payment of one-third of the crop to the laborer who furnished his own rations." So there is a certain amount of confusion on her part as to the terms for division of output between laborer and tenant. Most reports of share contracts show 1/4 to 1/2 of the crop as the return to labor alone (see Appendix 4 below). Hammond's observation of a rising share to labor is what is of interest here.

[138] See, for example, DeBow's Review (February, 1868), 207-13 in which the "Department of Immigration and Labor" included (1) The Report of General Wagener of South Carolina, who was that state's Commissioner of Immigration. General Wagener's Report covered his attempts to induce, Germans, Scandinavians, and Irish to emigrate to the South, and gave the budget of the South Carolina Bureau of Immigration as well. (2) An article titled "Traduction of the South in Europe," in which John L. Zundstron, agent in Stockholm for the Louisiana Bureau of Immigration, described the "slanders" spread about the South by unscrupulous rival Northern and Western agents, to dissuade emigration to the South, and (3) a sample letter written to the Louisiana Bureau of Immigration showing opportunities available for immigrants.

[139] See, for example, William M. Burwell, "Science and the Mechanic Arts against Coolies," DeBow's Review (July, 1869), 560-4, which opposed Chinese immigration while arguing for white immigration; or the article titled "Immigrants Wanted," DeBow's Review (March, 1869), 243-4, which stated "...we need the moral and intellectual influence of white foreigners in addition to our own people."

[140] A.R. Lightfoot, "Condition and Wants of the Cotton Raising States," DeBow's Review (Feb. 1869), 153-4.

[141] "Cotton and Labor," Southern Cultivator, XXVII (Nov. 1869), 838.

[142] David Dickson, "Mr. Dickson on Immigration," ibid. (August, 1869), 238-9.

[143] G.D.H., "Immigration," ibid. (Sept. 1869), 281.

[144] For example, Walter Fleming, "Immigration to the Southern States," Political Science Quarterly, XX, No. 2 (June, 1905); Bert James Loewenberg, "Efforts of the South to Encourage Immigration, 1865-1900," South Atlantic Quarterly, XXXIII, No. 4 (October, 1934); Rowland T. Berthoff, "Southern Attitudes Toward Immigration, 1865-1914," Journal of Southern History, XVII, (1951), 328-60.

[145] Fleming, "Immigration to the Southern States," 276.

[146] Loewenberg, "Efforts of the South to Encourage Immigration...," 363-4.

[147] Ibid., 368-80, passim.

[148] Berthoff, "Southern Attitudes...," 328.

[149] Ibid., 331. Berthoff cites Public Opinion (Washington, 1886-1906), XXXVIII (1904), 47; Railway World (Philadelphia, 1856-1915), XLVIII (1904), 1491-92; Caroline E. MacGill, "Immigration into the Southern States," in The South in the Building of the Nation (13 vols., Richmond, 1909-1913), VI, 593-4, in support of his assertion.

[150] Berthoff, "Southern Attitudes...," 343.

[151] Ibid., 345.

[152] Ibid., 344, citing Henry Cabot Lodge, "Lynch Law and Unrestricted Immigration," North American Review (Boston, 1815-1938), CLII (1891), 602-605; and James Basset Moore, A Digest of International Law (8 vols., Washington, 1906), VI, 843-49.

[153] Theodore Salutos, "Southern Agriculture and the Problems of Readjustment: 1865-1877," Agricultural History, Vol. 30, No. 2 (April, 1956),71. Salutos cites "Coolie Labor at the South," The Nation, I (August 31, 1865), 264-265; "The Chinese Problem," The Rural Carolinian, I (April, 1870), 434; New Orleans Price Current, XLI (October 16, 1869), 2; DeBow's Review, II (August, 1866), 215-217; IV (October, 1867), 362-364; V (January, 1868), 82.

[154] "A Vigorous Protest," Southern Cultivator and Dixie Farmer, XLVII (March, 1889), 144.

[155] "Concentrating Their Efforts," ibid. (Feb. 1889), 87.

[156] Berthoff, "Southern Attitudes...," 347-8,citing Fleming, "Immigration and the Negro Problem," Southern Lumberman, XLIX, No. 578 (1906), 22-3.

[157] Walter L. Fleming, Documentary History of Reconstruction: Political, Military, Social, Religious, Educational and Industrial, 1865 to the Present Time (2 vols,; Cleveland: Arthur H. Clark Company, 1907), II, 310. The passage is from J.S. Pike, Prostrate State, p. 55, dealing with South Carolina in 1871.

[158] Southern Workman, IX (December, 1880), 121-3; XII (May, 1883), 55.

[159] "Immigration and the Negro," Alexander's Magazine, Vol. 2, No. 2 (June 15, 1906), 16-7.

[160] Fleming, Documentary History of Reconstruction..., II, 320, citing Charles Nordhoff, The Cotton States in 1875, pp. 21, 107.

[161] ROIC, X, 908-9.

[162] Ibid., 925, testimony of Hon. Robert Ransom Poole, Commissioner of Agriculture of the State of Alabama.

[163] Ibid., 910-11.

[164] Gilbert Thomas Stephenson, Race Distinctions in American Law (New York: AMS Press, 1969; reprinted with permission of Appleton-Century-Crofts, New York, 1910), 351.

[165] Roger W. Shugg, Origins of Class Struggle in Louisiana: A Social History of White Farmers and Laborers during Slavery and After, 1840-1875,([Baton Rouge]: Louisiana State University Press, 1939 and 1968), 252. Shugg's references are

* DeBow's Review, III, 356.
** E.g., [New Orleans] Crescent, Jan. 22, 29, 1869.
*** Statement of the Sugar and Rice Crops Made in Louisiana, 1869-70, ix-x.
**** [New Orleans] Crescent, Feb. 11, 1869

[166] LaWanda Cox, "The American Agricultural Wage Earner, 1865-1900," Agricultural History, Vol. 22, No. 2 (April, 1948), 97. Cox's source for this episode is apparently Appleton's Annual Cyclopaedia...1880, 482.

[167] Enoch M. Banks, The Economics of Land Tenure in Georgia, Studies in History, Economics and Public Law, Vol. XXIII, No. 1 (New York, Columbia University Press, 1905), 78-9.

[168] Ibid., 115.

[169] Ibid., 113.

[170] Ibid.

[171] Vernon Lane Wharton, The Negro in Mississippi, 1865-1890, Volume 28 of The James Sprunt Studies in History and Political Science (Chapel Hill: University of North Carolina Press, 1947), 120.

[172] Ibid., 114. The quotation is from the Hinds County Gazette (Jan. 22, 1879).

[173] Wharton, The Negro in Mississippi, 114-5. The references are

* Hinds County Gazette, November 27, December 11, 25, 1878, January 5, February 5, 19, March 5, 26, April 2, 1879.
** Jackson Weekly Clarion, April 23, 1870.
*** Ibid., May 14, 1879, quoting the Greenville (Miss.) Times.
**** Ibid., April 23, 1879; Senate Reports, No. 693, 46th Cong., 2nd Sess., part ii, p. 501.
***** Senate Reports, No. 693, 46th Cong., 2nd Sess., part ii, p. 500.

[174] Wharton, The Negro in Mississippi, 106.

[175] Southern Workman, IV (Jan. 1875), 2.

[176] Ibid. (Sept. 1875), 67.

[177] "Labor," ibid., VII (Oct. 1878), 77.

[178] Ibid.

[179] Ibid.

[180] Ibid., VII (Nov. 1878), 85; VIII (Feb. 1879), 16.

[181] "Another Negro Exodus," ibid., XIII (Feb. 1884), 17.

[182] Ibid., XVIII (April, 1889), 1.

[183] Ibid., VIII (May, 1879), 51.

[184] Loewenberg, "Efforts of the South to Encourage Immigration," 365.

[185] Bruce, Plantation Negro as Freeman, 214-15.

[186] Ibid., 188.

[187] Ibid., 186.

[188] Red Bone [pseud.], "Fertilizers and Labor," Southern Cultivator, XXX (May, 1872), 168.

[189] W.J. Northen, "Methods Compared," ibid., XLVII (Dec. 1889), 605.

[190] Nicholas Worth, "Autobiography of a Southerner," 166.

[191] "Farming in the South," DeBow's Review (April, 1868), 367-8.

[192] ROIC, X, 62, testimony of J. Pope Brown, President of Georgia State Agricultural Society.

[193] World's Work (June, 1907), 8960.

[194] Fleming, Documentary History of Reconstruction..., II, 324, citing E.A. Smith, "Cotton Production by Whites and Blacks," Report on Cotton Production of the State of Alabama, Census of 1880.

[195] Ibid., II, 441, citing J.C. Hardy, South's Supremacy in Cotton Growing, p. 8.

[196] Ibid., 442.

[197] Extracts from Letters of Teachers and Superintendents of the New England Educational Commission for Freedmen, Vol. 39 of Pamphlets on Slavery, Harvard Widener Library Collection, p. 6.

[198] RJCR, Part I, 117.

[199] RJCR, Part II, 182.

[200] Schurz, Report, 82.

[201] "A Georgia Plantation," Scribner's Monthly, XXI, No. 6 (April, 1881), 830.

[202] Ibid., 830-1 and 833-4.

[203] Runnion, "The Negro Exodus," 229.

[204] Wharton, The Negro in Mississippi, 121, citing the Raymond Gazette (May 8, 1886).

[205] ROIC, X, 382-3. The quotation consists of relevant parts of Mr. Hale's answers to a series of questions put by the Commission.

[206] Ibid., 383.

[207] Ibid., 926.

[208] Ibid.

[209] Southern Cultivator, XXVII (Feb. 1869), 50-1.

[210] James Steele, "Revolution in Southern Agriculture," ibid., 53.

[211] Dixie [pseud.], "Nut Grass-the Labor Question," ibid. (Sept. 1869), 277.

[212] Southern Workman, IV (Sept. 1875), 64.

[213] "Immigrants--Do They Pay?", ibid., VI (May, 1877), 35.

[214] Ibid., VIII (May, 1879), 52.

[215] "Northern and Southern Views of What Emancipation has Accomplished," ibid., V (Oct. 1876), 78.

[216] Ibid.

[217] Ibid., VII (Feb. 1878), 10. For the previous reference to this article, see Note 95.

[218] T.T.B. [T.T. Bryce?], "Negro Labor," ibid., IX (March, 1880), 45.

[219] See, for example, ROIC, X, 378, testimony of J.H. Hale; Dixie [pseud.], "Nut Grass--the Labor Question," Southern Cultivator, XXVII (Sept. 1869), 277; H.H.G., "Immigration and the Labor Question," ibid. (December, 1869), 374.

[220] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. VII: Report of the Industrial Commission on the Relations and Conditions of Capital and Labor Employed in Manufactures and General Business (Washington: Government Printing Office, 1901), 64-5. Hereafter referred to as ROIC, VII.

[221] ROIC, X, 120, testimony of Mr. L.W. Youmans, a farmer and merchant from Fairfax, South Carolina.

[222] ROIC, X, 455, testimony of Mr. J.E. Nunnally, a farmer of Nunnally, Georgia.

[223] ROIC, X, 46, 52, testimony of Mr. James Barrett, a farmer of Augusta, Georgia.

[224] ROIC, XI, 123.

[225] RJCR, Part IV, 131, testimony of Caleb G. Forshey.

[226] Hart, Southern South, 45 and 265. Notice the contradiction concerning the presence of whites on plantations.

[227] For an example of this, see Abbott, "The South and the Negro," 229.

[228] Shugg, Origins of Class Struggle in Louisiana, 266, citing the New Orleans Picayune (Sept. 8, 1867).

[229] The overproduction arguments were summarized in a similar way in Volume VI of The South in the Building of the Nation:

"Though there was always in the South an insufficient production of home supplies by the average farmer and planter, the decrease in the production of food materials or home supplies marks a change in plantation methods of profound economic importance. Many causes have contributed to this condition. Among them are the following:

1. The almost exclusive use of cotton as the basis of credit to farmers, and the absence of adequate working capital in farming.

2. The want of foresight, a temperamental characteristic of a large body of the more ignorant and thoughtless class of negro renters.

3. The general prevalence of the renting system with its exemption from direction and control. This reduces the number of "hands" working for wages under the direction of those who have most foresight and intelligence and most interest in building up a more diversified and restorative system of agriculture, by which food crops would be grown.

4. The insufficiency of home supplies is partly due also to the indifference or approval of the advancing merchant, who, to sell supplies at a profit from his store, usually urges that the maximum acreage be put in cotton.

5. The greater familiarity of the body of agricultural laborers in the cotton belt with cotton culture than with diversified agriculture.

6. The almost universal system of annual or short term rentals and the absence of any general system of valuing the young grain crops that might be growing at the end of the renter's period of tenancy. This in many states keeps the more enterprising class of tenants from growing fall-sown crops, such as wheat or oats."

J.F. Duggar, "Areas of Cultivation in the South," SBN, VI, 21-2.

[230] Southern Cultivator's subscription varied from $1 to $2 per year, compared to $6 per year for DeBow's Review; it claimed 200,000 readers (not all of whom were necessarily subscribers) every month in 1889 (XLVII (May, 1889), 230); and an examination of the advertisements for farm equipment, patent medicines, fertilizers and clothing leaves no doubt that the Cultivator was aimed at the ordinary, if somewhat more prosperous than average, farmer.

[231] Sylvius [pseud.], "The True Policy of the South," Southern Cultivator, II (Jan. 1849), 10.

[232] Whitman H. Owens, ibid. (Oct. 1849), 103.

[233] Southern Cultivator, XXVII (Jan. 1869), 44.

[234] See, for example his advertisement in this same January, 1869 issue of the Cultivator, 45. Dickson ads appeared in many other issues of the Southern Cultivator as well.

[235] The issues which were available to this writer were for the years 1849, 1869, 1872, 1874, 1878, and 1889. It would have been preferable, of course, to have had a complete collection particularly for the early 1880's and into the '90's, if publication continued that long. Still, the volumes which were read should provide a sufficient sample to demonstrate the confusion that existed among the contributors.

[236] Southern Cultivator, XXVII (Feb. 1869), 50-1.

[237] P[anola] [pseud.], "Letter from Panola--Corn vs. Cotton, &c," ibid., 60.

[238] Acorn [pseud.], "Diversity of Crops, &c," ibid. (June, 1869), 174.

[239] Subscriber [pseud.], "Grain and Stock vs. Cotton Culture," ibid. (July, 1869), 214.

[240] Random [pseud.], "Bread for the South," ibid. (Sept. 1869), 280.

[241] J. Quitman Moore, "'Mr. Dickson on Immigration' Reviewed," ibid. (Oct. 1869), 302.

[242] "Farm Policy--Reasons for a Change of, At the South," ibid., XXX (Feb. 1872), 44-5.

[243] P.C. Wilkes, "Cotton vs. Grain Crops and Stock-Raising," ibid. (April, 1872), 126.

[244] Acorn [pseud.], "The Philosopher's Stone--Pay as You Go," ibid., XXXII (April, 1874), 129.

[245] "Extent of Cotton Planting for Next Crop," ibid. (May, 1874), 173.

[246] Ibid.

[247] "Thoughts for the Month," ibid. (Jan. 1874), 1.

[248] Ibid. (April, 1874), 137.

[249] "Georgia Patrons of Husbandry," ibid. (Oct. 1874), 391-2, reprint of an address by T.J. Smith, Master of the Georgia State Grange.

[250] "Make Cotton on Your Own Capital--Borrowing Ruinous," Southern Cultivator, XXXII (Nov. 1874), 420-1.

[251] "Crop Notes, &c.," ibid. (June, 1874), 241.

[252] R.I. McDowell, "The Cost of Cotton Culture," ibid., XXXVI (May, 1878), 75, reprinted from Southern Home (n.p., n.d.).

[253] "Corn and Cotton on Old Broomsedge Land," ibid., XXXVI (Oct. 1878), 378.

[254] G.M. Stokes, "Encouraging Signs Among the Farmers," ibid. (April, 1878), 153.

[255] A Friend of the Cultivator [pseud.], "Cost of Cotton Production," ibid. (Nov. 1878), 444.

[256] "Thoughts for the Month--For the Month of January," Southern Cultivator and Dixie Farmer, XLVII (Jan. 1889), 2.

[257] Jno. H. Dent, "An Address to the Farmers," ibid. (Feb. 1889), 75; Mr. Dent repeated his point in "The Farmers of the South must Reform," ibid. (April, 1889), 163; see also Tar Heel [pseud.], "A 'Tar Heel's' Observations," ibid., 203.

[258] Alpha [pseud.], "Then and Now," ibid. (Sept. 1889), 446.

[259] "American Cotton," ibid. (Feb. 1889), 100.

[260] R.J.R., "From Cotton to Grass and Stock Farming--Bermuda Grass--Burr Clover--Red Clover and Bermuda--Texas Blue Grass--Best Cattle," ibid. (Aug. 1889), 385.

[261] W.J. Northen, "Our Opportunity," ibid. (Oct. 1889), 519.

[262] For example, "What We Need," DeBow's Review (Jan. 1868), reprinted from the Columbus, Georgia Enquirer (n.d.); also "Farming in the South," DeBow's Review (April, 1868), 367.

[263] "Industrial Association of Mississippi," ibid. (Jan. 1868), 83. The quotation is from a report on a meeting of "a number of influential gentlemen recently met and organized at Jackson 'to encourage, develop, and improve the Agriculture, Horticulture, and the Manufacturing and Mechanic Arts of the State, as those upon which the comfort, prosperity, and happiness of all classes primarily depend.'"

[264] "Agricultural Department," ibid. (Feb. 1870), 187-8.

[265] Henry W. Grady, "Cotton and Its Kingdom," Harper's New Monthly Magazine, LXIII (Oct. 1881), 719-20.

[266] Ibid., 723.

[267] Matthew Brown Hammond, "Cotton Production in the South," SBN, VI, 96.

[268] Thomas F. Hunt, "Cereal Farming in the South," SBN, VI, 113.

[269] Hart, Southern South, 267.

[270] Nicholas Worth, "Autobiography of a Southerner," 481.

[271] D.A. Tompkins, "The South's Vast Resources," World's Work (June, 1907), 8952.

[272] "Nature's Garden Spot," advertising section of World's Work (June, 1907), pages not numbered. "Nature's Garden Spot" consisted of the eastern section of Virginia, the Carolinas and Georgia, Florida and Central Alabama.

[273] "The Negro Question," Southern Workman, XIX (June, 1890), 65.

[274] "Diversified Farming," ibid., V (March, 1876), 22, reprinted from Prairie Farmer (n.p., n.d.).

[275] F. Richardson, "Hints on Agriculture," ibid., VI (Sept. 1877) 69.

[276] U.S. Congress, Senate, Report of the Committee on Agriculture and Forestry on Condition of Cotton Growers in the United States, the Present Prices of Cotton, and the Remedy; and on Cotton Consumption and Production, 53d Cong., 3d Sess., Report 986 (2 vols.; Washington: Government Printing Office, 1895). The discussion here is abstracted from the section summarizing the testimony and the Committee's findings, Vol. I, iii-xliv. This Report will hereafter be referred to as RCCG, I and RCCG, II.

[277] Ibid., vi.

[278] Ibid., xliii.

[279] ROIC, X, ccxlii-ccxliii.

[280] ROIC, X, 78, testimony of Mr. P.H. Lovejoy.

[281] ROIC, X, 117-21, passim.

[282] To take an example almost at random, William E. Highsmith, "Landholding During War and Reconstruction," Louisiana Historical Quarterly, XXXVIII, No. 1, contains Louisiana references to both the distress resulting from concentration on cotton and the profitability of cotton above that of alternative crops.

[283] Overproduction due to farmers' price-response rigidity also requires that the properly deflated relative cotton price declined secularly. Examination of the price data used in Chapter VII reveals that there were periods of relative cotton price decline that lasted for several years. The deflated cotton price does not appear to have declined steadily after 1880, however.

[284] "Mr. Northen's Address," Southern Cultivator and Dixie Farmer, XLVII (Sept. 1889), 456. The address was delivered before the Georgia State Agricultural Society at Cedartown, Georgia, August 13, 1889.

[285] Banks, Economics of Land Tenure in Georgia, 51, 101.

[286] See note 283 above.

[287] Nicholas Worth, "Autobiography of a Southerner," 171.

[288] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. XV: Reports of the Industrial Commission on Immigration and on Education (Washington: Government Printing Office, 1901), 553. Hereafter referred to as ROIC, XV.

[289] Robert Somers, Southern States Since the War, 1870-71 (London and New York: Macmillan and Co., 1871), 271.

[290] Ibid., 268.

[291] ROIC, X, 920, testimony of the Hon. Robert Ransom Poole, Commissioner of Agriculture of the State of Alabama.

[292] J.F. Duggar, "Areas of Cultivation in the South," SBN, VI, 22.

[293] See, for example, Richard Sutch and Roger Ransom, "Debt-Peonage in the Cotton South After the Civil War," (mimeographed, but soon to be published).

[294] Ibid., 17.

[295] Ibid., 19.

[296] A careful and thorough discussion of possible sources of monopoly power in the hands of the rural furnishing merchants can be found in Sutch and Ransom, ibid., 42-50.

[297] Thomas D. Clark, "The Furnishing and Supply System in Southern Agriculture Since 1865," Journal of Southern History, XII, No. 1 (February, 1946), 37.

[298] Ibid., 37.

[299] Matthew Brown Hammond, The Cotton Industry: An Essay in American Economic History (New York: Macmillan Company, 1897; reprinted by Johnson Reprint Corporation of New York), 139-40.

[300] Hammond, "Cotton Production in the South," SBN, VI, 92-3.

[301] ROIC, X, xvi.

[302] Ibid., cvi-cvii.

[303] RCCG, I, 347.

[304] Ibid.

[305] Walter Fleming, "The Economic Conditions During the Reconstruction," SBN, VI, 7. As the title of the essay indicates, Fleming's description is applicable to the Reconstruction period.

[306] Agricola [pseud.], "The Labor Question," Southern Cultivator, XXVII (July, 1869), 207.

[307] Ibid.

[308] "The Labor System of the South," ibid., XXXVI (Nov. 1878), 427.

[309] Fortune, Black and White..., 243. Fortune's reference for this testimony is to the Blair Senate Committee on Education and Labor, The Relations Between Capital and Labor (Vol. II), 157 ff.

[310] Fortune, Black and White..., 243-4.

[311] Ibid., 244.

[312] Ibid., 246.

[313] Ibid., 248, 253.

[314] Ibid., 250, 252.

III. SOME THEORETICAL DIFFICULTIES

The preceding chapter has established the impossibility of settling any of the outstanding questions of post-bellum Southern economic history by reference solely to the writings of contemporary observers. Subsequent chapterswill develop more powerful quantitative tests of the alternative hypotheses on the labor market, the over-all productivity of whites and blacks, and the relative profitability of the alternative crops. The rationale of the tests will be outlined below. In addition, it is necessary to dispose of some theoretical difficulties involved in designing these tests. That is the purpose of this chapter.

Chapters IV and V consist of estimates of agricultural production functions for each Southern state in each census year from 1880 to 1910. The specification of these production functions includes parameters which, depending on their values, express one or the other of the competing hypotheses. Estimation of the values of these parameters, combined with appropriate statistical tests of significance, will then determine which hypothesis is consistent with the quantitative historical data.

For example, given the production function estimates, it is possible to calculate the share of output which would have been received by labor had it been paid according to its marginal productivity. This "competitive" labor share, if compared with the share of output actually received in payment for labor services alone (which can be

determined independently of the production function estimates) will support either the Competition Hypothesis or the Exploitation Hypothesis. If the marginal productivity labor share implied by the production function estimates is greater than what sharecroppers actually did receive in payment for their labor, the Competition Hypothesis can be rejected in favor of the Exploitation Hypothesis. Conversely, if the competitive labor share implied by the estimated parameters of the production function is roughly equal to what agricultural workers actually did receive, the Exploitation Hypothesis can be rejected in the aggregate.

Similarly, the production function specification will explicitly parameterize potential productivity differences between the races, and the estimates of the productivity parameters will be used to test the hypotheses of systematic black/white productivity differentials. Finally, the over-all productivity in value terms of cotton as compared to the alternative crops will be parameterized, to determine whether cotton "overproduction" was manifested in an output loss associated with concentration in cotton.

Chapter VII uses time series price and acreage data to estimate farmers' price responsiveness and speed of adjustment in their behavior as cotton suppliers, to further test the hypothesis that farmers were "locked in" to an unprofitable cotton crop.

The data which form the basis of the production function estimates are the published census county cross-sections on agricultural

inputs and output from 1880 to 1910. Because of the nature of the data and the special institutional arrangements in Southern agriculture (e.g., the existence of sharecropping), the production functions cannot be estimated without consideration of the following four difficulties:

(1) Did the form of tenure make a difference? In other words, did the existence of sharecropping in agriculture distort the pattern of factor allocation or distribution of the output between the factors?

(2) Is it possible to circumvent the identification problem associated with estimating production functions from input and output data? Alternatively, what error structure, model of producer behavior, and estimation technique can lead to well-behaved parameter estimates given only input and output data?

(3) Is aggregation of the production functions possible? If so, do the aggregate county input and output data correspond to the appropriate aggregate variables in the aggregate production functions?

(4) Is it possible to take account of the intrinsic differences in soil fertility? "Land" was not a uniformly homogeneous factor of production, so that serious errors of measurement would result from using acreage alone as the land input in the production function.

Before presenting and discussing the results of the actual estimations, each of these difficulties must be dealt with and overcome.

(1) Sharecropping and tenure institutions. Any model that purports to represent the behavior of agricultural workers and landlords in the late 19th century South must allow for the coexistence of

sharecropping, renting of land for cash, wage labor by agricultural workers, and owner-operated farms which sometimes employed agricultural workers. Intuitively, if the production functions were constant returns to scale and if competition prevailed in the factor markets, the equilibrium in the absence of risk considerations should have been one in which both workers and landlords were indifferent between the various tenure arrangements. If workers were free to move about and to enter work arrangements voluntarily, and if landlords were free to operate their farms under any form of tenure they chose, no tenure arrangement would have been preferred by either workers or landlords in equilibrium, provided all the different forms of tenure were coexistent. This conclusion has been reached by other investigators [1]. Of course, a landless laborer would prefer to own his land, in order to be able to draw the actual or imputed rent, but that is different from the issue of whether a landless laborer would rather rent a farm, work on shares, or work for wages.

The contrary "classical" supposition that sharecropping leads to allocational inefficiency has been incorporated into a general equilibrium model by Bardhan and Srinivasan [2]. Their model requires as an equilibrium condition that the marginal product of land in sharecropping be equal to zero [3], which is implausible for the 19th century South. The tenant farms of that period were small, and it seems unlikely that they were so extensively cultivated that additional acreage would have contributed nothing to output. It is also easy to show that if the production functions are constant returns, a Bardhan

and Srinivasan-type model has no interior solution and is therefore not consistent with the coexistence of wage labor, cash renting and sharecropping [4]. Even with decreasing returns, the Bardhan and Srinivasan model cannot accommodate simultaneous cash rentals and sharecropping [5]. These properties make the Bardhan and Srinivasan model inappropriate for agriculture in the 19th century South.

The model used here is similar to the one first proposed by Cheung [6], but the development will be carried out along lines suggested by Temin [7]. The production functions will include three factors--land, labor and capital--instead of only land and labor, but it will be seen that this modification is a minor one. The problem of non-homogeneous soil inputs will be deferred, since the purpose of the present demonstration is to show that different tenure arrangements by themselves have no effect on resource allocation or distribution.

Assume a constant returns production function which is the same for each of the forms of tenure. Let this production function also be well-behaved, so that the first-order conditions for an extremum are maximum conditions [8]. Assume at first that the landlord provides all the capital equipment in sharecropping, with the sharecroppers providing only their labor.

Write the production for a given farm (without any subscript denoting the farm) as

$$q_i = F^i(l_i, h_i, k_i) \qquad i = s, p, w \tag{3-1}$$

where

q = output

l = labor input

h = land input

k = capital input

and the indices s, p, and w designate the outputs and inputs in sharecropping, cash renting, and owner operation with the use of hired labor, respectively. Let l_o = the labor contribution of the owner-operator himself.

For a landlord operating all three types of farm simultaneously, profit can be written

$$\pi = r F^s(l_s,h_s,k_s) + p h_p + F^w(l_w,h_w,k_w) - w(l_w - l_o) - v(k_s + k_w) \qquad (3\text{-}2)$$

where

r = share received by landlord under sharecropping

p = the rental rate for land

w = the wage rate for hired labor

v = the price of capital.

The landlord's leisure will be ignored, which amounts to fixing l_o and excluding it from the landlord's set of decision variables. Inclusion of leisure would not alter the model, except that the landlord would maximize utility instead of profits and l_o would be a decision variable. The results of the analysis would be substantially unchanged. Also, the landlord whose profit function is given in (3-2) above is one who operates farms under all three forms of tenure. It will be

seen momentarily that the argument is unchanged even if he is operating under only one or two of the alternative tenure forms.

This landlord maximizes profits. But if competition prevails in the labor market, he will face the constraint that no laborer will work under any form of tenure which earns less income for the laborer than an alternative form. These constraints can be expressed as

$$(1 - r)\ F^{s}(l_s, h_s, k_s) = wl_s \tag{3-3}$$

$$(1 - r)\ F^{s}(l_s, h_s, k_s) = F(l_s, h_x, k_x) - ph_x - vk_x \tag{3-4}$$

where h_x and k_x represent the optimal amounts of land and capital which a laborer would rent at the market rates should he choose to rent a farm for cash rather than work as a sharecropper. Constraints (3-3) and (3-4) represent the condition that the sharecropper could earn an equivalent income working either as a wage hand or as a cash tenant. The requirement that h_x and k_x be optimal amounts of land and capital for the renter imply

$$F_2(l_s, h_x, k_x) = p \tag{3-5}$$

and

$$F_3(l_s, h_x, k_x) = v \tag{3-6}$$

What justifies the assumption of perfect labor, land and capital markets implied by these constraints on the landlord's profit maximization, particularly since competition in the labor market is one of the hypotheses being tested? The answer is this: perfect competition will be assumed throughout this derivation, as well as in establishing the

existence of the aggregate production functions. The assumption of perfect competition is embedded in the entire estimation technique. The estimated parameters of the production function determine what share of output would be received by labor under perfectly competitive conditions. This competitive labor share will finally be compared with the independently observed share of output actually received by agricultural laborers (sharecroppers). If the final estimated competitive labor share diverges markedly from the actual observed labor share, it must mean that at some point the assumption of perfect competition was false. In other words, rough equality between the estimated competitive labor share and the actual labor share is a necessary condition for the Competition Hypothesis. On the other hand, if the estimated competitive labor share agrees with the actual observed share, there will be no reason to doubt the operation of competition in the labor market, even though such a result cannot ultimately prove the Competition Hypothesis. A fortuitous combination of imperfections and immobilities could conceivably produce an apparent equality between the estimated marginal product of labor and the wage. But such an outcome can hardly be expected. Also, if the aggregation theorems, tenure results, and consistency of the parameter estimates are robust to deviations from perfect competition (so that the production function estimates are accurate), a necessary condition for the Exploitation Hypothesis is that the calculated competitive labor share be greater than the actual observed labor share. In the subsequent discussion, the results will be loosely characterized as supporting either the Exploitation

Hypothesis or the Competition Hypothesis depending on the outcome of the comparison between the estimated marginal product of labor and the actual wage.

Returning to the model, the constraint on the amount of land owned by the landlord can be expressed as

$$h_s + h_p + h_w = h \tag{3-7}$$

Of course, the landlord could rent additional land and hire labor to work it, but with perfect competition and constant returns, any additional output generated by this procedure would be divided by the owners of these factors, so no increase in profits could be obtained. Hence, this possibility will be ignored.

Thus, the landlord maximizes profits (3-2) subject to (3-3), (3-4) and (3-7). This leads to the Lagrangean

$$\begin{aligned} \mathcal{L} = r F^s + ph_p + F^w - w(l_w - l_o) - v(k_s + k_w) \\ -\lambda[h_s + h_p + h_w - h] \\ -\mu_1[(1-r)F^s - wl_s] \\ -\mu_2[(1-r)F^s - F(l_s, h_x, k_x) + ph_x + vk_x] \end{aligned} \tag{3-8}$$

The first-order conditions for an interior maximum (with all three tenure forms present) and with all land utilized will be

$$\frac{\partial \mathcal{L}}{\partial l_s} = r F_1^s - \mu_1(1-r)F_1^s + \mu_1 w - \mu_2(1-r)F_1^s + \mu_2 F_1(l_s, h_x, k_x) = 0 \tag{3-9}$$

$$\frac{\partial \mathcal{L}}{\partial l_w} = F_1^w - w = 0 \tag{3-10}$$

$$\frac{\partial \mathcal{L}}{\partial h_s} = r F_2^s - \lambda - \mu_1(1-r)F_2^s - \mu_2(1-r)F_2^s = 0 \tag{3-11}$$

$$\frac{\partial \mathcal{L}}{\partial h_p} = p - \lambda = 0 \tag{3-12}$$

$$\frac{\partial \mathcal{L}}{\partial h_w} = F_2^w - \lambda = 0 \tag{3-13}$$

$$\frac{\partial \mathcal{L}}{\partial k_s} = r F_3^s - v - \mu_1(1-r)F_3^s - \mu_2(1-r)F_3^s = 0 \tag{3-14}$$

$$\frac{\partial \mathcal{L}}{\partial k_w} = F_3^w - v = 0 \tag{3-15}$$

The landlord's decision variables are the amounts of land allotted to each of the tenure forms, the labor desired for sharecropping and as wage help, and the capital employed on the sharecropped and owner-operated farms. In addition to these first-order conditions, landlord equilibrium also requires that no money be lost to the landlord as a result of his use of the sharecropping form. In Cheung, the assumption is made that the sharecrop share r is itself another decision variable [9]. Here it will simply be assumed that the equilibrium r be such as to maximize profits, since otherwise sharecropping would be abandoned. (Landlords are free to choose the tenure forms they operate with.) In either case, the additional equation

$$\frac{\partial \mathcal{L}}{\partial r} = F^s + \mu_1 F^s + \mu_2 F^s = 0 \tag{3-16}$$

must be added to the list of first-order conditions. These first-order conditions together imply ordinary marginal product factor pricing:

$\mu_1 + \mu_2 = -1$ from (3-16), so (3-17)

$F_1^W = w$ from (3-10) (3-18)

$F_2^S = p$ from (3-11), (3-12) and (3-17) (3-19)

$F_2^W = p$ from (3-12) and (3-13) (3-20)

$F_3^S = v$ from (3-14) and (3-17) (3-21)

$F_3^W = v$ from (3-15) (3-22)

In addition,

$$F_1^S = -\mu_1 F_1^W - \mu_2 F_1(l_S, h_X, k_X) \quad \text{from (3-9), (3-17) and (3-18)} \tag{3-23}$$

In order to complete the demonstration of ordinary marginal product factor pricing under all tenures, it remains to be shown that

$$F_1^W = F_1(l_S, h_X, k_X) \tag{3-24}$$

From (3-5) and (3-20) and from (3-6) and (3-22) respectively,

$$F_2^X = p = F_2^W \tag{3-25}$$

$$F_3^X = v = F_3^W \tag{3-26}$$

writing $F(l_S, h_X, k_X)$ as F^X.

But since F is constant returns, (3-25) and (3-26) together imply the equality of the factor ratios

$$\frac{h_X}{l_S} = \frac{h_W}{l_W} \tag{3-27}$$

$$\frac{k_X}{l_S} = \frac{k_W}{l_W} \tag{3-28}$$

Therefore (3-24) also follows from the properties of constant returns production functions [10]. Combining (3-17, 18, 23) and (3-24) completes the demonstration that the marginal product of labor is equal to the wage under each tenure arrangement.

Modification of the model to allow the capital costs in sharecropping to be divided between landlord and tenant does not change the conclusion of marginal product factor pricing in all tenures. The profit function and the competitive labor market constraints become in this case

$$\pi = r F^S + ph_p + F^W - w(l_w - l_o) - vk_w - r\,vk_s \tag{3-29}$$

$$(1-r)F^S - (1-r)vk_s = wl_s \tag{3-30}$$

$$(1-r)F^S - (1-r)vk_s = F^X - ph_x - vk_x \tag{3-31}$$

The only first-order conditions which are altered are the partial derivatives with respect to k_s and with respect to r. These become

$$\frac{\partial \mathcal{L}}{\partial k_s} = r F_3^S - rv - \mu_1(1-r)F_3^S + \mu_1(1-r)v - \mu_2(1-r)F_3^S + \mu_2(1-r)v = 0 \tag{3-32}$$

$$\frac{\partial \mathcal{L}}{\partial r} = F^S - vk_s + \mu_1 F^S - \mu_1 vk_s + \mu_2 F^S - \mu_2 vk_s = 0 \tag{3-33}$$

or

$$(F^S - vk_s)(1 + \mu_1 + \mu_2) = 0 \qquad \text{from (3-33)} \tag{3-34}$$

Now vk_s is the total capital cost in sharecropping, so as long as this cost does not constitute the entire output, (3-17) follows from (3-34). From (3-32),

$$F_3^s[r + (1 - r)(-\mu_1 - \mu_2)] + v[-r + (1 - r)(\mu_1 + \mu_2)] = 0 \qquad (3\text{-}35)$$

So combining (3-17) and (3-35) yields (3-21) again, provided (3-30) and (3-31) hold so that μ_1 and μ_2 are not zero. Hence, none of the marginal product factor pricing conditions is changed when the capital costs are shared in sharecropping in the same proportion as the output.

It is easy to see that the essential steps in the reasoning are unchanged if only one or two of the forms of tenure are employed by the landlord. If only cash renting and wage labor are involved, there is no doubt that competition will result in marginal product factor pricing. If only sharecropping and one of the other tenure forms co-exist, then profit maximization under the appropriate constraint (either (3-3) or (3-4))will again yield marginal product factor pricing in all tenure forms. The essential point is the same--if workers are free to move from farm to farm, and if landlords are free to choose the form of tenure under which they operate their farms, then constant returns to scale is sufficient to guarantee that sharecropping has no impact on distribution or allocation.

Of course, this somewhat bland result does nothing to explain the locational pattern of sharecropping throughout the South. Considerations of risk are probably crucial in determining the incidence of cropsharing [11]. The model developed here and the estimates based on it do not deal with the risk element at all. The arrangements made for risk sharing are not directly relevant to the issue of static imperfection in the labor market. A risk premium in addition to ground

rent accruing to landlords, for example, cannot be considered to be exploitation. Sharecropping may have amounted to a crude form of insurance, and insurance premiums are not monopoly profits. In actuality, one might expect the sharecrop share received by workers to be somewhat higher than their purely competitive share exclusive of risk, for in a sharecropping arrangement the tenant and landlord share the risk, while if the landlord simply hires for wages, the workers bear none of the risk.

Similarly, the impetus to sharecropping as a means of providing the labor force with an incentive is not considered here. This element of sharecropping may have played a role, but in a competitive setting the threat of dismissal, piecework incentives, bonuses, etc., could equally well have served to motivate otherwise recalcitrant laborers. The incentive issue may be worth pursuing, but this is not necessary in the limited context of deciding the question of exploitation versus competition in the labor market.

(2) Least-squares and identification. The production functions ultimately estimated are all of a generalized Cobb-Douglas form. The difficulties in estimating Cobb-Douglas production functions from cross-section input and output data are well known [12]. The general problem is that if the decision-makers maximize profits subject to the technical production relation, the inputs will be correlated with any disturbance appearing in the production function. Therefore ordinary least squares applied to the input and output data will result in

biased and inconsistent parameter estimates. However, Zellner, Kmenta and Drèze have suggested a model which sidesteps this difficulty [13]. Briefly, they assume that the disturbance enters the production function in the following way:

$$q_i = A\, l_i^{\alpha}\, h_i^{\beta}\, k_i^{\gamma}\, e^{u_{oi}} \qquad (3\text{-}36)$$

where i is the index for the i'th producing unit and u_{oi} is a normally distributed random disturbance with mean 0 and variance σ_{oo}^2 "representing factors such as weather, unpredictable variations in machine or labor performance, etc." [14]. They assume further that decision-makers maximize expected profits, and that the prices are either known with certainty or are statistically independent of the production function disturbance. In addition, random "human error" deviations from the optimum input selections on the part of producers are allowed.

This model conforms well to the facts of agricultural production, since the random "act of nature" component of the production function (representing weather, pests, or other unforeseen factors) is independent of any human errors in production. Furthermore, farmers must be aware of the random element in their productive process, even though they cannot know exactly in what direction it will operate. Many production decisions, such as allocation of acreage to the different crops or the initial application of labor to plowing and preparation, must be made before any knowledge of the random factor in the production function can be obtained. Hence, farmers would be rational to maximize

something like expected profits, and the assumptions of the model would hold. Under these conditions, Zellner, Kmenta and Drèze show that ordinary least squares applied to input and output data is an appropriate estimation technique. (See Appendix 1 for a replication of the proof.)

(3) Aggregation. It is also well known that not all production functions allow aggregation, even under conditions of perfect competition [15]. However, constant returns production functions of the type to be introduced in the later chapters do belong to the class of functions for which aggregation is possible. In addition, they have the property that the labor, land and capital aggregates are the natural aggregates obtained by summing the individual farm inputs over the county. (See Appendix 2 for proofs.)

(4) Heterogeneity of soils. This problem was treated by allowing the constant term in the production function to vary from county to county according to the physical and chemical properties of the soil. Southern soils were assayed and classified in the 1880 census [16]. The existence of this 1880 geographic survey is in some sense a fortunate accident, since it provides a ready-made means of identifying intrinsic fertility differences of the various types of Southern soil. Variation of the production function constant term across counties belonging to different soil type categories allows for over-all fertility differences associated with physically heterogeneous soils.

With these difficulties out of the way, it is possible to proceed to the estimation of the production functions.

NOTES TO CHAPTER III

[1] Steven N.S. Cheung, The Theory of Share Tenancy (Chicago: University of Chicago Press, 1969); Joe D. Reid, Jr., "Some Risk Is an Impetus to Sharecropping" (Philadelphia: unpublished manuscript, July, 1971); these conclusions have also been confirmed and amplified in discussions with Peter Temin at M.I.T.

[2] P.K. Bardhan and T.N. Srinivasan,"Cropsharing Tenancy in Agriculture: A Theoretical and Empirical Analysis," American Economic Review, LXI, No. 1 (March, 1971), 48-64.

[3] Ibid., 49.

[4] This result is due to Peter Temin. It follows from the fact that in a Bardhan and Srinivasan model with the three forms of tenure, both partial derivatives of the production function evaluated at the equilibrium quantities of land and labor used in sharecropping are greater than the corresponding partial derivatives of the production function evaluated at the quantities of land and labor in fixed rents. Either the production functions are different under the different forms of tenure (and there is no reason to expect this should be so) or workers will not divide their time between sharecropping and working land rented for cash. Again, this result requires constant returns production functions.

[5] Bardhan and Srinivasan, "Cropsharing Tenancy...," footnote 8, pp. 51-2.

[6] Cheung, The Theory of Share Tenancy, 16-29.

[7] Conversations and unpublished work during 1971-72.

[8] Sufficient conditions (i.e., for first- and second-order conditions) for constrained maximization in models of the type used here (with more than one constraint) may be found in Kevin Lancaster, Mathematical Economics (London: The Macmillan Company, 1968), 52-4. The production functions specified and estimated in subsequent chapters are "well-behaved" in the sense in which this term is used here.

[9] Cheung, The Theory of Share Tenancy, 19-21.

[10] For any constant returns production function F with three factors, $q = F(l,h,k)$ can be written

$$\frac{q}{l} = F\left(1, \frac{h}{l}, \frac{k}{l}\right), \quad \text{or}$$

$$q = l\,F\left(1, \frac{h}{l}, \frac{k}{l}\right)$$

Therefore

$$\frac{\partial q}{\partial h} = l\,F_2\left(1, \frac{h}{l}, \frac{k}{l}\right)\cdot\frac{1}{l} = F_2\left(1, \frac{h}{l}, \frac{k}{l}\right), \text{ and}$$

$$\frac{\partial q}{\partial k} = F_3\left(1, \frac{h}{l}, \frac{k}{l}\right)$$

Thus, since $\partial q/\partial h$ and $\partial q/\partial k$ are functions of h/l and k/l only,

$$F_2^x = p = F_2^w \quad \text{and}$$

$$F_3^x = v = F_3^w$$

together imply

$$\frac{h_x}{l_s} = \frac{h_w}{l_w} \quad \text{and} \quad \frac{k_x}{l_s} = \frac{k_w}{l_w}$$

But

$$\frac{\partial q}{\partial l} = F\left(1, \frac{h}{l}, \frac{k}{l}\right) + l\,F_2\left(1, \frac{h}{l}, \frac{k}{l}\right)\left(-\frac{h}{l^2}\right) + l\,F_3\left(1, \frac{h}{l}, \frac{k}{l}\right)\left(-\frac{k}{l^2}\right)$$

$$\frac{\partial q}{\partial l} = F\left(1, \frac{h}{l}, \frac{k}{l}\right) - \left(\frac{h}{l}\right)F_2\left(1, \frac{h}{l}, \frac{k}{l}\right) - \left(\frac{k}{l}\right)F_3\left(1, \frac{h}{l}, \frac{k}{l}\right)$$

which is also a function of only the two factor ratios h/l and k/l. Hence $F_1^w = F_1^x$.

[11] This seems to be the consensus among all the recent investigators. See Cheung, The Theory of Share Tenancy; Bardhan and Srinivasan, "Cropsharing Tenancy in Agriculture...," Reid, "Some Risk...," and Joseph E. Stiglitz, "Incentives and Risk-Sharing in Sharecropping," (unpublished manuscript); although Reid questions some of Cheung's conclusions on this point.

[12] See, for example, Marc Nerlove, Estimation and Identification of Cobb-Douglas Production Functions (Chicago: Rand McNally and Company; Amsterdam: North Holland Publishing Company, 1965).

[13] A. Zellner, J. Kmenta, and J. Drèze, "Specification and Estimation of Cobb-Douglas Production Function Models," Econometrica, Vol. 34, No. 4 (Oct. 1966).

[14] Ibid., 787.

[15] For a survey of the problem, see Franklin M. Fisher, "The Existence of Aggregate Production Functions," Econometrica, Vol. 37, No. 4 (Oct. 1969).

[16] U.S. Census Office, Tenth Census, 1880, Vol. V-VI: Report on Cotton Production in the United States; also Embracing Agricultural and Physico-geographical Descriptions of the Several Cotton States and of California, ed. Eugene W. Hilgard (Washington: Government Printing Office, 1884).

IV. SPECIFICATION AND ESTIMATION OF THE AGRICULTURAL PRODUCTION FUNCTIONS

A. Specification

It is useful to begin by reviewing the information sought by estimation of Southern agricultural production functions:

(i) The estimates should allow calculation of the output share due to labor under conditions of perfect competition, so that the hypothesis of exploitation in the labor market can be tested. It has been shown in the previous chapter that for constant returns production functions, competition in the factor markets allows the distributional and allocative impact of sharecropping to be ignored, and the farm production functions to be aggregated to the county level. It is desirable but not necessary that the production function have reasonably simple distributional properties, so that the competitive labor share not be too difficult to calculate.

(ii) Potential differences in black and white labor productivity should be allowed. However, the specification should not require that both types of labor be present in order for production to take place. This latter requirement rules out the black and white labor force variables from entering multiplicatively.

(iii) Similarly, the function should allow for productivity differences associated with the cultivation of different crops. This will allow testing the hypothesis that cotton had lower over-all profitability (to the entire agricultural sector) than the alternative crops. Again,

there should be no requirement that all crops be produced in order to achieve a positive level of output, since many counties reported no cotton grown at all.

(iv) Intrinsic soil fertility differences due to physical, chemical and possibly climatic differences should be allowed for.

(v) Finally, the production function should be constant returns to scale. This requirement is necessary for the theorems on tenure and aggregation to hold true. Incidentally, estimation of the production functions without imposing the constraint of constant returns will allow a test of the constant returns assumption. As in the test of competition, if the unconstrained estimates do not deviate from constant returns, it may be concluded that constant returns is consistent with the data. The constant returns requirement cannot be proved by this test, however.

(vi) The error structure should be such as to allow consistent estimation of the parameters by ordinary least squares applied to the county cross-section input and output data.

A production function possessing properties (i)-(vi) is the following:

$$Q = A_1^{S_1} A_2^{S_2} \cdots A_N^{S_N} (aW + bB)^{\alpha} (cH + dJ)^{\beta} K^{\gamma} e^{u_0} \qquad (4\text{-}1)$$

where

Q = value of all agricultural output net of intermediate products fed to livestock,

S_i = a set of dummy variables, one for each of the N soil types in each state, with the property that $S_i = 1$ when

the county described by the production function is of soil type i, and $S_i = 0$ otherwise,

W = white agricultural labor input,

B = black agricultural labor input,

H = cotton land input

J = agricultural land input for all usages other than cotton culture,

K = agricultural capital input, and

u_o = a random disturbance term, normally distributed with mean 0 and variance σ^2.

For a full discussion and detailed definitions of these variables, see Appendix 3. Also, this aggregate production function is defined for each county, but the county subscripts on the variables are omitted for simplicity in notation. The constant terms will vary between counties belonging to the different soil type categories, but will be the same for all counties with a given soil type.

As in the previous cahpter, it is assumed that the random disturbance term embodies unforeseeable factors such as variations in temperature and rainfall, and that the decision-makers maximize expected profits. The producing units are the individual farms, but the tentative assumption of perfect competition within counties allows aggregation to the county level. The sample of counties for each estimate consists of the counties making up each of the ten major cotton-producing Southern states in each of the four Census years 1880-1910. Omitting Texas in 1890 and 1900, and Virginia altogether [1], there are 38 production function estimates in all.

The sample limits were chosen to avoid the difficulties involved in pooling cross-section data over time [2] and to facilitate discussion of the results by summarizing the estimates as "the" production function of a given state in a given year [3].

In most of the subsequent discussion, the production function (4-1) will be discussed in its logarithmic form. Hence

$$\log Q = \sum_{i=1}^{N} B_i S_i + \alpha \log (aW + bB) + \beta \log (cH + dJ) + \gamma \log K + u_0 \qquad (4\text{-}2)$$

with

$$B_i = \log A_i \; ; \; i = 1,2,\ldots,N$$

will also be referred to as "the production function." The results of estimating the parameters of (4-1) or (4-2) will be designated the Group I results. In addition, for purposes of discussion of the static and distributional properties of the model, the disturbance term will be ignored [4].

It is easy to verify that production function (4-1) satisfies requirements (i)-(vi). Suppose both whites and blacks are paid the value of the marginal products of their respective labors. Then labor's share of output is given by

$$S = \frac{1}{Q}\left[\frac{\partial Q}{\partial W} \cdot W + \frac{\partial Q}{\partial B} \cdot B\right] = \frac{\partial Q}{\partial W} \cdot \frac{W}{Q} + \frac{\partial Q}{\partial B} \cdot \frac{B}{Q} \qquad (4\text{-}3)$$

But

$$\frac{\partial Q}{\partial W} = \alpha a \frac{Q}{aW + bB} \qquad (4\text{-}4)$$

$$\frac{\partial Q}{\partial B} = \alpha b \frac{Q}{aW + bB} \qquad (4\text{-}5)$$

So

$$S = \alpha a \frac{Q}{aW + bB} \cdot \frac{W}{Q} + \alpha b \frac{Q}{aW + bB} \cdot \frac{B}{Q} = \alpha \qquad (4\text{-}6)$$

which is the same as the ordinary Cobb-Douglas result. By an analogous argument, β = land's share in output if both types of land are rented at the value of their marginal products. The share of capital is given by γ, and as in the ordinary Cobb-Douglas function, returns to scale is given by the sum $\alpha + \beta + \gamma = \nu$.

Differences in black and white labor productivity are embodied in the values of the parameters a and b. Similarly, crop-associated productivity differences are parameterized by c and d. One note of caution is required in interpreting these parameters, however. If c and d are different, completely free substitutability between the crops would imply that total specialization in cotton or total abandonment of cotton would be the outcome of rational crop-choice decisions. Such a consequence of the model would be unrealistic. For example, a finding that $c > d$ should be interpreted in one of the following ways: (1) Cotton tended to be concentrated on the most fertile land, and did not spread over the entire improved acreage because not all land was suitable for cotton culture. Farmers grew cotton on their best lands, but could not expand its cultivation indefinitely. (2) There were some other advantages enjoyed by cotton farmers (greater skills? marketing advantage?) which could not be extended throughout the agricultural population. Conversely, if $c < d$, the indication would be that farmers would have been able to produce a greater value of output if they had

been able to shift out of cotton. If they could not diversify, it was presumably due to some peculiarity of the soil or to some sort of "lock in" caused by merchants' control and preference for cotton. In other words, the estimated values of the parameters c and d are indicative of over-all levels of crop-associated productivity, but they do not represent productivity differences resulting simply from an unconstrained decision to plant one crop or the other. However, should one of the parameters prove to be larger than the other, it would reflect a pressure to expand the production of the advantageous crop at the expense of the alternatives. Increased output of the more productive crop could only be restricted by physical, geographical or institutional factors in this case. The relative magnitudes of c and d should therefore provide a first test of the notion that Southern agricultural output could have been increased had the farmers diversified.

This specification also raises an identification problem, which will be referred to again and again in the discussion. A difference in the estimated values of a and b may represent different levels of skill or human capital differences between the races. It could also represent, however, differences in the fertility of the lands farmed by members of the two races. Similarly, the c and d parameters might represent a skill differential between cotton farmers and non-cotton farmers. For this reason, the productivity differentials captured by different estimated values of a and b or c and d will always be designated only as "race-associated productivity differences" and "crop-associated productivity differences."

The coefficients of the dummy variables represent the intrinsic soil fertility differences after race- and crop-associated productivity differences are taken into account. The specification will allow a test of the over-all significance of the coefficients of the S_i as compared to a single constant term, and thereby will verify whether or not the Hilgard soil type categories actually did correspond to soils of different intrinsic net fertilities.

Thus, requirements (i)-(vi) are satisfied. However, the production function (4-2) is not linear in all the unknown parameters. In particular, a, b, c, and d enter the function in a non-linear way. A non-linear technique could be used to estimate a, b, c, and d, but in view of the large amount of data to be processed and the difficulty in deciding on an initial point from which to start any search process, it was decided to approximate the production function by linearizing it in a Taylor series expansion. Write

$$f(a,b) = \log(aW + bB) \tag{4-7}$$

Expand $f(a,b)$ in Taylor series around (a_o, b_o). Let this point be chosen such that $a_o = b_o$. This could be considered to be "the point of insufficient reason" if no a priori judgments are to be made about the productivity differences between the races. The first few terms of the Taylor series expansion of this function of two variables are

$$f(a,b) = f(a_o,b_o) + (a - a_o)\frac{W}{a_oW + b_oB} + (b - b_o)\frac{B}{a_oW + b_oB} \qquad (4\text{-}8)$$

$$+ \frac{1}{2!}\left[(a - a_o)^2(-1)\frac{W^2}{(a_oW + b_oB)^2} + 2(a - a_o)(b - b_o)(-1)\right.$$

$$\left. \times \frac{WB}{(a_oW + b_oB)^2} + (b - b_o)^2(-1)\frac{B^2}{(a_oW + b_oB)^2}\right]$$

$$+ \text{higher order terms}$$

Setting $a_o = b_o$, this expansion becomes

$$f(a,b) = \log(a_oW + a_oB) + \left(\frac{a}{a_o} - 1\right)\left(\frac{W}{W+B}\right) + \left(\frac{b}{a_o} - 1\right)\left(\frac{B}{W+B}\right) \qquad (4\text{-}9)$$

$$- \frac{1}{2!}\left(\frac{a}{a_o} - 1\right)^2\left(\frac{W}{W+B}\right)^2 - \frac{2}{2!}\left(\frac{a}{a_o} - 1\right)\left(\frac{b}{a_o} - 1\right)\left(\frac{W}{W+B}\right)\left(\frac{B}{W+B}\right)$$

$$- \frac{1}{2!}\left(\frac{b}{a_o} - 1\right)^2\left(\frac{B}{W+B}\right)^2 + \text{higher order terms.}$$

Inspection of the first few terms of this Taylor series reveals sufficient conditions for convergence, as follows:

$$\frac{W}{W+B} < 1 \quad \text{and} \quad \frac{B}{W+B} < 1, \text{ so } \frac{W^jB^k}{(W+B)^{j+k}} \to 0 \text{ as } j+k \to \infty \qquad (4\text{-}10)$$

Also, the numerical coefficients of each term will be of the form

$$\frac{\binom{n}{j}}{n!} = \frac{n!}{j!(n-j)!n!} = \frac{1}{j!(n-j)!} \to 0 \quad \text{as } n \to \infty \qquad (4\text{-}11)$$

Therefore, the series will converge if

$$\left|\frac{a}{a_o} - 1\right| < 1 \quad \text{and} \quad \left|\frac{b}{a_o} - 1\right| < 1 \qquad (4\text{-}12)$$

by comparison to a convergent geometric series [5].

Rewriting these inequalities as

$$-1 < \frac{a}{a_o} - 1 < 1 \quad \text{and} \quad -1 < \frac{b}{a_o} - 1 < 1 , \tag{4-13}$$

this sufficient condition for convergence becomes

$$0 < a < 2a_o \quad \text{and} \quad 0 < b < 2a_o \tag{4-14}$$

Since a_o can be picked arbitrarily, these conditions can always be met. However, the series will converge more rapidly the closer a_o is to a and b. a_o can be picked at will, so it can always be close to a or to b, but can only be close to both if a is close to b. Hence, the linear approximation of f(a,b) obtained by dropping the quadratic and all higher order terms will be a better approximation the closer a is to b. But the linear approximation can still be used even if a and b are greatly different, since the Taylor series <u>always</u> converges for <u>some</u> value of a_o.

Thus, if all non-linear terms are omitted,

$$f(a,b) = \log a_o + \log (W+B) + \frac{a}{a_o} \cdot \frac{W}{W+B} + \frac{b}{a_o} \cdot \frac{B}{W+B} - 1 \tag{4-15}$$

But

$$\frac{W}{W+B} = 1 - \frac{B}{W+B} , \text{ so}$$

$$f(a,b) = \left(\log a_o + \frac{a}{a_o} - 1 \right) + \log (W+B) + \frac{1}{a_o} (b-a) \frac{B}{W+B} \tag{4-16}$$

So that

$$\alpha \log (aW+bB) = C' + \alpha \log (W+B) + \frac{\alpha}{a_o} (b-a) \frac{B}{W+B} \tag{4-17}$$

A similar argument can be made to show

$$\beta \log (cH+dJ) = C'' + \beta \log (H+J) + \frac{\beta}{c_o} (c-d) \frac{H}{H+J} \tag{4-18}$$

Combine all these results, write $W+B=R$ and $H+J=T$, rename the constants, and note that for any constant D,

$$\sum_{i=1}^{N} B_i S_i + D = \sum_{i=1}^{N} (B_i + D) S_i \quad \text{since} \quad \sum_{i=1}^{N} S_i = 1 \tag{4-19}$$

Therefore, the final linear approximation of (4-2) is

$$\log Q = \sum_{i=1}^{N} C_i S_i + \alpha \log R + \beta \log T + \gamma \log K + \frac{\alpha}{a_o} (b - a) \frac{B}{R} + \frac{\beta}{c_o} (c-d) \frac{H}{T} \tag{4-20}$$

Several comments can be made about this approximation technique. First, because the values of a_o and c_o are absorbed by the constant term, there is no need to guess a <u>priori</u> values of a_o and c_o close to the actual values of a and c. On the other hand, this advantage is partially offset by the fact that since a_o and c_o are not distinguishable from the constants (or each other), there is no way to recover any information on the absolute magnitudes of a and b or c and d. It might be thought that a and c could be scaled arbitrarily at, say, $a = 1$ and $c = 1$ since scaling can be absorbed in the C_i constants. This would be possible except that it would necessitate constrained estimation of the coefficients of B/R and H/T. Unconstrained estimation would admit the possibility of <u>negative</u> estimated values of b and d, which would make no economic sense.

For suppose the scale were set so that $a = 1$. Then expand

$$f(b) = \log (W + bB) \tag{4-21}$$

in Taylor series around $b = 1$. Ignoring the higher-order terms as before, the result is

$$f(b) = \log(W+B) + (b-1)\frac{B}{W+B} \tag{4-22}$$

Thus the coefficient of B/R in the estimated equation would be

$$\theta = \alpha(b-1) \tag{4-23}$$

So that

$$b = \frac{\theta}{\alpha} + 1 \tag{4-24}$$

If θ is not constrained, it is possible for the estimated values of b to be less than zero, which is economically meaningless. In fact, $b < 0$ if $\theta < 0$, $\alpha > 0$, and $|\theta| > \alpha$. Unconstrained estimation could well generate values of θ and α in this range, and indeed, examination of the results below shows a large number of cases of θ and α combinations which imply $b < 0$ if $a = 1$. Since the purpose of the Taylor series approximation is to simplify the estimations and to avoid costly search procedures or intractable constrained estimation, the arbitrary scaling of $a = 1$ cannot be used.

Therefore the only information that can be extracted from the estimates of the coefficients of B/R and H/T are the signs of the differences (b - a) and (c - d), and whether these differences are significantly different from zero. Not being forced to guess values of a_o and c_o a priori guarantees that the Taylor series approximation will converge (and hence that linearization is feasible), but because a_o and c_o are unknown, the actual magnitudes a, b, c, and d cannot be recovered.

The Group I results of estimating (4-15) are as follows:

TABLE IV.1

North Carolina -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.260(.0819) [3.175]	.448(.0936) [4.790]	.325(.0640) [5.087]	.345(.0685) [5.037]
β	.407(.0674) [6.036]	.335(.114) [2.937]	.500(.0773) [6.473]	.518(.0725) [7.149]
γ	.326(.0682) [4.780]	.275(.116) [2.372]	.156(.0879) [1.773]	.143(.0840) [1.706]
$\frac{\alpha}{a_o}$ (b - a)	.687(.173) [3.965]	.372(.189) [1.963]	.424(.134) [3.156]	.452(.146) [3.103]
$\frac{\beta}{c_o}$ (c - d)	1.219(.226) [5.389]	.438(.262) [1.674]	.488(.191) [2.559]	1.307(.190) [6.868]
ν	.993(.0470) [-.149]	1.058(.0585) [.991]	.981(.0377) [-.504]	1.006(.0406) [-.148]
R^2	.961	.919	.958	.966
F(m,n)	255.4(8,84)	122.4(8,86)	244.0(8,86)	288.5(8,82)
obs	93	95	95	91
u*'u*	2.38447	3.75025	1.68962	1.86561
u'u	2.53224	3.93311	1.98743	2.18748

TABLE IV.1 -- Continued

South Carolina -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.203(.157) [1.292]	.415(.185) [2.237]	.200(.135) [1.480]	-.186(.137) [-1.357]
β	.277(.135) [2.047]	.517(.186) [2.777]	.537(.142) [3.780]	.645(.109) [5.926]
γ	.407(.0995) [4.087]	.148(.159) [.931]	.227(.150) [1.518]	.447(.0908) [4.916]
$\frac{\alpha}{a_o}(b-a)$	.292(.232) [1.258]	-.212(.268) [-.790]	-.441(.145) [-3.050]	-.455(.145) [-3.137]
$\frac{\beta}{c_o}(c-d)$	1.044(.372) [2.812]	.930(.469) [1.985]	1.265(.262) [4.823]	1.800(.236) [7.623]
ν	.887(.0794) [-1.423]	1.080(.102) [.784]	.964(.0544) [-.662]	—
R^2	.967	.936	.965	.978
F(m,n)	71.76(9,22)	39.08(9,24)	86.24(9,28)	143.4(9,29)
obs	32	34	38	39
u*'u*	.286584	.592397	.240073	.186624
u'u	.396139	.951389	.605753	.823080

TABLE IV.1 -- Continued

Georgia -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.590(.0671) [8.795]	.444(.0589) [7.534]	.450(.0677) [6.641]	.164(.0467) [3.520]
β	.283(.0645) [4.386]	.407(.0590) [6.893]	.377(.0676) [5.573]	.524(.0378) [13.857]
γ	.243(.0536) [4.544]	.170(.0495) [3.427]	.221(.0715) [3.090]	.333(.0437) [7.633]
$\frac{\alpha}{a_o}(b-a)$	-.116(.0991) [-1.168]	.221(.0824) [2.685]	-.258(.0730) [-3.531]	-.0604(.0595) [-1.015]
$\frac{\beta}{c_o}(c-d)$	1.124(.208) [5.407]	1.521(.178) [8.526]	.905(.177) [5.120]	1.294(.124) [10.409]
ν	1.116(.0362) [3.204]	1.021(.0316) [.665]	1.048(.0283) [1.696]	1.021(.0211) [.995]
R^2	.960	.970	.968	.986
F(m,n)	244.6(12,121)	317.1(12,119)	301.3(12,118)	759.4(12,128)
obs	134	132	131	141
u*'u*	3.07850	2.27590	1.67515	1.18222
u'u	3.75645	2.53452	2.12863	2.44083

TABLE IV.1 -- Continued

Florida-- Group I

Estimated Parameter	1880	1890	1900	1910
α	.364(.126) [2.889]	.521(.158) [3.300]	.227(.156) [1.452]	-.335(.230) [-1.460]
β	.365(.110) [3.301]	.107(.181) [.592]	.0400(.102) [.392]	.159(.147) [1.085]
γ	.201(.0783) [2.573]	.484(.141) [3.429]	.745(.120) [6.227]	1.133(.165) [6.871]
$\frac{\alpha}{a_o}(b-a)$	-.413(.378) [-1.092]	-.132(.437) [-.301]	-.497(.317) [-1.565]	.163(.546) [.298]
$\frac{\beta}{c_o}(c-d)$	2.004(.799) [2.507]	.454(.815) [.557]	2.469(.735) [3.358]	1.229(1.036) [1.186]
ν	.930(.0921) [-.760]	1.112(.0924) [1.212]	1.012(.0884) [.136]	—
R^2	.955	.919	.935	.915
F(m,n)	77.21(8,29)	49.35(8,35)	57.69(8,32)	45.85(8,34)
obs	38	44	41	43
u*'u*	1.62567	4.30723	1.83362	3.84342
u'u	2.38727	5.00741	2.46329	4.81499

TABLE IV.1 -- Continued

Tennessee -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.404(.112) [3.613]	-.0319(.0640) [-.499]	.247(.0628) [3.935]	.240(.0619) [3.885]
β	.137(.118) [1.156]	.659(.0821) [8.024]	.503(.0712) [7.065]	.453(.0805) [5.630]
γ	.421(.0892) [4.716]	.339(.0656) [5.175]	.238(.0676) [3.520]	.333(.0729) [4.574]
$\frac{\alpha}{a_o}$ (b - a)	.266(.195) [1.367]	.270(.157) [1.722]	-.148(.168) [-.880]	.105(.182) [.577]
$\frac{\beta}{c_o}$ (c - d)	1.369(.330) [4.145]	.493(.257) [1.916]	.481(.299) [1.612]	.206(.314) [.655]
ν	.962(.0344) [-1.105]	——	.988(.0276) [-.435]	1.026(.0298) [.872]
R^2	.978	.984	.980	.980
F(m,n)	211.3(16,75)	285.1(16,75)	223.7(16,75)	222.5(16,74)
obs	92	92	92	91
u*'u	1.34740	.792777	.838624	1.04603
u'u	2.56976	1.51585	1.25621	2.56563

TABLE IV.1 -- Continued

Alabama -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.808(.126) [6.400]	.434(.0993) [4.372]	.443(.0820) [5.400]	.187(.0598) [3.127]
β	.340(.103) [3.294]	.539(.0644) [8.376]	.541(.0585) [9.251]	.625(.0573) [11.082]
γ	-.0183(.0827) [-.222]	.158(.0700) [2.256]	.108(.0829) [1.305]	.264(.0607) [4.353]
$\frac{\alpha}{a_o}$ (b - a)	-.194(.187) [-1.041]	-.114(.114) [-1.003]	-.284(.0859) [-3.308]	-.453(.0766) [-5.914]
$\frac{\beta}{c_o}$ (c - d)	1.669(.381) [4.382]	1.087(.272) [3.990]	1.024(.227) [4.503]	1.125(.198) [5.694]
ν	——	1.131(.0607) [2.158]	1.092(.0429) [2.145]	1.076(.0398) [1.910]
R^2	.974	.982	.984	.979
F(m,n)	144.5(13,51)	200.3(13,49)	231.7(13,49)	171.6(13,49)
obs	65	63	63	63
u*'u*	1.01875	.524055	.250262	.209915
u'u	1.37078	1.53858	.344849	.381332

TABLE IV.1 -- Continued

Mississippi -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.212(.104) [2.042]	.118(.103) [1.140]	.357(.0522) [6.839]	.228(.0597) [3.811]
β	.295(.0986) [2.993]	.672(.108) [6.193]	.334(.0426) [7.844]	.396(.0557) [7.101]
γ	.529(.0815) [6.489]	.150(.106) [1.415]	.303(.0654) [4.636]	.364(.0752) [4.838]
$\frac{\alpha}{a_o}$ (b - a)	-.225(.284) [-.792]	.585(.207) [2.833]	-.122(.0823) [-1.483]	-.309(.0895) [-3.451]
$\frac{\beta}{c_o}$ (c - d)	1.707(.450) [3.792]	.842(.309) [2.726]	.976(.126) [7.728]	1.475(.178) [8.293]
ν	1.036(.0709) [.508]	.940(.0648) [-.926]	.994(.0278) [-.216]	.988(.0320) [-.375]
R^2	.959	.960	.989	.990
F(m,n)	107.2(13,60)	112.1(13,61)	403.3(13,61)	475.2(13,63)
obs	74	75	75	77
u*'u*	2.90427	2.07485	.355923	.490952
u'u	3.11330	3.81807	.639033	1.15984

TABLE IV.1 -- Continued

Arkansas -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.410(.101) [4.065]	.301(.105) [2.871]	.277(.103) [2.691]	.239(.102) [2.341]
β	.377(.0967) [3.898]	.315(.0911) [3.459]	.138(.110) [1.257]	.376(.0884) [4.258]
γ	.199(.0702) [2.837]	.307(.0661) [4.649]	.633(.0965) [6.553]	.365(.0751) [4.864]
$\frac{\alpha}{a_o}$ (b - a)	-.408(.134) [-3.054]	.168(.117) [1.446]	-.0822(.114) [-.718]	-.527(.106) [-4.949]
$\frac{\beta}{c_o}$ (c - d)	2.281(.214) [10.666]	1.358(.157) [8.627]	1.244(.185) [6.739]	1.972(.168) [11.744]
ν	.986(.0362) [-.387]	.923(.0321) [-2.399]	1.048(.0361) [1.330]	.980(.0458) [-.437]
R^2	.957	.970	.964	.968
F(m,n)	139.0(10,62)	204.7(10,63)	169.7(10,63)	183.3(10,61)
obs	73	74	74	72
u*'u*	.839847	.595576	.569946	.628253
u'u	1.00982	.675252	.644752	.982887

TABLE IV.1 - Continued

Louisiana -- Group I

Estimated Parameter	1880	1890	1900	1910
α	.202(.159) [1.268]	.393(.112) [3.516]	.335(.113) [2.972]	.229(.106) [2.157]
β	.374(.144) [2.607]	.220(.0779) [2.819]	.476(.110) [4.333]	.290(.0904) [3.209]
γ	.448(.0935) [4.788]	.378 .0608) [6.213]	.167(.0553) [3.028]	.424(.0782) [5.414]
$\frac{\alpha}{a_o}$ (b - a)	.673(.378) [1.779]	.664(.248) [2.674]	.294(.212) [1.386]	-.0123(.224) [-.0552]
$\frac{\beta}{c_o}$ (c - d)	.501(.409) [1.224]	.600(.255) [2.353]	.495(.324) [1.525]	1.127(.425) [2.649]
ν	1.024(.0959) [.250]	.991(.0724) [-.124]	.978(.0651) [-.338]	.943(.0716) [-.796]
R^2	.916	.927	.924	.924
F(m,n)	44.71(11,45)	53.25(11,46)	50.88(11,46)	49.68(11,45)
obs	57	58	58	57
u*'u*	3.83072	2.16770	1.75323	1.77907
u'u	4.58390	2.61086	2.65074	2.32386

TABLE IV.1 -- Continued

Texas -- Group I

Estimated Parameter	1880	1910
α	.157(.0760) [2.070]	.263(.0907) [2.903]
β	.313(.0683) [4.584]	.703(.0778) [9.033]
γ	.681(.0943) [7.225]	.172(.105) [1.631]
$\frac{\alpha}{a_o}(b - a)$	.500(.815) [.614]	.487(.450) [1.080]
$\frac{\beta}{c_o}(c - d)$	2.474(1.442) [1.715]	2.049(.339) [6.051]
ν	1.151(.0819) [1.844]	1.138(.0597) [2.312]
R^2	.954	.911
F(m,n)	286.4(15,206)	148.5(15,218)
obs	222	234
u*'u*	275.199	72.5995
u'u	289.358	77.8685

TABLE IV.1 -- Continued

North Carolina -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	2.021(.409) 4 [4.944]	1.630(.535) 4 [3.050]	2.656(.351) 4 [7.578]	2.777(.381) 2 [7.282]
C_2	2.125(.439) 2 [4.841]	1.687(.579) 3 [2.914]	2.850(.378) 1 [7.547]	2.879(.411) 1 [7.013]
C_3	2.171(.447) 1 [4.853]	1.788(.581) 2 [3.076]	2.725(.378) 3 [7.205]	2.702(.407) 3 [6.642]
C_4	2.102(.429) 3 [4.900]	1.789(.561) 1 [3.189]	2.774(.362) 2 [7.656]	2.563(.385) 4 [6.653]

TABLE IV.1 -- Continued

South Carolina -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	3.443(.766) 4 [4.495]	1.730(1.044) 4 [1.658]	3.009(.543) 3 [5.543]	3.297(.509) 2 [6.477]
C_2	3.660(.748) 1 [4.895]	2.207(.951) 1 [2.322]	3.265(.542) 1 [6.028]	3.458(.523) 1 [6.615]
C_3	3.595(.811) 2 [4.434]	1.936(1.101) 2 [1.759]	3.100(.560) 2 [5.532]	3.257(.508) 3 [6.414]
C_4	3.439(.775) 5 [4.436]	1.684(1.057) 5 [1.593]	2.861(.549) 4 [5.208]	3.137(.505) 4 [6.209]
C_5	3.542(.808) 3 [4.384]	1.742(1.108) 3 [1.572]	2.767(.551) 5 [5.024]	2.906(.505) 5 [5.754]

TABLE IV.1 -- Continued

Georgia -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	1.588(.353) 6 [4.500]	2.143(.312) 7 [6.868]	2.179(.285) 7 [7.642]	2.128(.224) 8 [9.498]
C_2	1.423(.336) 7 [4.240]	2.043(.304) 8 [6.725]	2.149(.277) 8 [7.759]	2.150(.213) 7 [10.113]
C_3	1.653(.349) 5 [4.734]	2.191(.312) 4 [7.028]	2.203(.280) 6 [7.874]	2.221(.219) 6 [10.128]
C_4	1.664(.347) 4 [4.801]	2.173(.309) 5 [7.024]	2.322(.287) 3 [8.098]	2.3177(.223) 5 [10.402]
C_5	1.343(.368) 8 [3.653]	2.210(.328) 3 [6.745]	2.257(.306) 5 [7.366]	2.3180(.237) 4 [9.766]
C_6	1.681(.338) 3 [4.971]	2.164(.304) 6 [7.124]	2.295(.286) 4 [8.026]	2.380(.223) 2 [10.657]
C_7	1.695(.324) 2 [5.236]	2.302(.293) 1 [7.866]	2.351(.276) 2 [8.506]	2.468(.218) 1 [11.306]
C_8	1.732(.311) 1 [5.572]	2.228(.276) 2 [8.074]	2.375(.255) 1 [9.331]	2.344(.208) 3 [11.285]

TABLE IV.1 -- Continued

Florida -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	3.028(.821) 3 [3.686]	1.816(.900) 3 [2.018]	2.114(.808) 4 [2.617]	1.621(1.236) 4 [1.312]
C_2	2.961(.714) 4 [4.150]	1.609(.757) 4 [2.127]	2.276(.753) 3 [3.023]	2.057(1.153) 2 [1.783]
C_3	3.192(.752) 2 [4.244]	1.824(.799) 2 [2.282]	2.335(.745) 2 [3.135]	1.795(1.130) 3 [1.588]
C_4	3.550(.682) 1 [5.207]	2.102(.704) 1 [2.985]	2.766(.697) 1 [3.970]	2.345(1.079) 1 [2.174]

TABLE IV.1 -- Continued

Tennessee -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	3.575(.387) 1 [9.229]	2.334(.284) 1 [8.203]	3.010(.334) 1 [9.022]	3.138(.372) 1 [8.428]
C_2	3.076(.379) 2 [8.107]	2.149(.276) 3 [7.772]	2.827(.325) 2 [8.708]	2.654(.341) 2 [7.782]
C_3	3.014(.388) 4 [7.579]	2.021(.277) 5 [7.304]	2.733(.318) 3 [8.591]	2.387(.333) 4 [7.161]
C_4	2.961(.393) 5 [7.542]	2.070(.273) 4 [7.572]	2.638(.312) 6 [8.460]	2.343(.325) 5 [7.200]
C_5	3.053(.358) 3 [8.535]	2.162(.257) 2 [8.409]	2.711(.287) 4 [9.438]	2.403(.304) 3 [7.894]
C_6	2.948(.363) 6 [8.111]	2.019(.257) 6 [7.873]	2.612(.289) 7 [9.025]	2.325(.306) 6 [7.600]
C_7	2.736(.377) 9 [7.267]	1.875(.265) 11 [7.066]	2.580(.295) 8 [8.732]	2.233(.312) 8 [7.148]
C_8	2.912(.385) 7 [7.573]	1.886(.271) 10 [6.954]	2.684(.301) 5 [8.925]	2.262(.316) 7 [7.163]
C_9	2.644(.341) 12 [7.754]	1.889(.241) 9 [7.832]	2.510(.270) 10 [9.286]	2.164(.284) 9 [7.605]
C_{10}	2.745(.364) 8 [7.534]	1.943(.254) 8 [7.637]	2.508(.282) 11 [8.879]	2.062(.301) 11 [6.852]
C_{11}	2.728(.379) 10 [7.202]	1.815(.264) 12 [6.869]	2.501(.294) 12 [8.512]	1.988(.310) 12 [6.405]
C_{12}	2.699(.372) 11 [7.254]	1.946(.262) 7 [7.412]	2.511(.294) 9 [8.550]	2.084(.312) 10 [6.676]

TABLE IV.1 -- Continued

Alabama -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	1.594(.653) 4 [2.441]	1.146(.565) 4 [2.026]	1.727(.416) 3 [4.148]	1.654(.422) 4 [3.923]
C_2	1.602(.655) 2 [2.448]	1.079(.580) 6 [1.860]	1.644(.427) 6 [3.848]	1.573(.426) 7 [3.693]
C_3	1.406(.638) 9 [2.205]	.950(.562) 8 [1.690]	1.614(.422) 9 [3.824]	1.545(.429) 9 [3.605]
C_4	1.598(.660) 3 [2.421]	.786(.568) 9 [1.385]	1.624(.425) 8 [3.826]	1.595(.431) 6 [3.703]
C_5	1.635(.639) 1 [2.561]	1.068(.553) 7 [1.931]	1.730(.411) 1 [4.207]	1.564(.415) 8 [3.766]
C_6	1.499(.627) 7 [2.392]	1.179(.557) 3 [2.119]	1.686(.417) 5 [4.044]	1.664(.418) 3 [3.978]
C_7	1.529(.634) 6 [2.410]	1.277(.562) 2 [2.274]	1.710(.418) 4 [4.088]	1.700(.421) 2 [4.041]
C_8	1.419(.649) 8 [2.186]	1.139(.569) 5 [2.001]	1.640(.420) 7 [3.902]	1.608(.419) 5 [3.833]
C_9	1.586(.565) 5 [2.806]	1.371(.529) 1 [2.592]	1.727(.403) 2 [4.291]	1.734(.412) 1 [4.208]

TABLE IV.1 -- Continued

Mississippi -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	1.815(.678) 8 [2.676]	2.239(.595) 9 [3.765]	2.674(.274) 9 [9.763]	2.542(.337) 8 [7.535]
C_2	1.821(.692) 7 [2.632]	2.310(.607) 8 [3.808]	2.733(.278) 5 [9.842]	2.620(.339) 6 [7.727]
C_3	1.963(.675) 2 [2.908]	2.360(.594) 7 [3.975]	2.734(.272) 4 [10.061]	2.756(.331) 2 [8.319]
C_4	1.887(.665) 5 [2.837]	2.623(.590) 4 [4.447]	2.717(.272) 7 [10.006]	2.591(.334) 7 [7.752]
C_5	1.781(.645) 9 [2.763]	2.615(.573) 5 [4.563]	2.786(.269) 2 [10.358]	2.388(.325) 9 [7.352]
C_6	1.884(.634) 6 [2.972]	2.778(.560) 2 [4.964]	2.970(.269) 1 [11.050]	2.948(.341) 1 [8.657]
C_7	1.933(.659) 3 [2.934]	2.501(.588) 6 [4.252]	2.703(.271) 8 [9.992]	2.709(.332) 5 [8.167]
C_8	1.892(.655) 4 [2.888]	2.723(.587) 3 [4.636]	2.742(.273) 3 [10.057]	2.719(.336) 4 [8.101]
C_9	1.986(.583) 1 [3.408]	2.911(.549) 1 [5.306]	2.727(.265) 6 [10.283]	2.745(.320) 3 [8.574]

TABLE IV.1 -- Continued

Arkansas -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	2.671(.341) 2 [7.832]	3.221(.283) 1 [11.400]	1.882(.332) 1 [5.673]	2.868(.429) 1 [6.692]
C_2	2.720(.333) 1 [8.167]	3.099(.284) 4 [10.905]	1.796(.332) 2 [5.413]	2.756(.423) 2 [6.521]
C_3	2.612(.348) 3 [7.514]	3.150(.297) 2 [10.622]	1.730(.341) 6 [5.074]	2.490(.429) 6 [5.809]
C_4	2.576(.337) 6 [7.643]	3.064(.285) 6 [10.754]	1.737(.330) 4 [5.267]	2.632(.413) 3 [6.373]
C_5	2.591(.346) 5 [7.480]	3.105(.294) 3 [10.575]	1.731(.339) 5 [5.114]	2.556(.419) 5 [6.095]
C_6	2.608(.340) 4 [7.665]	3.087(.290) 5 [10.644]	1.769(.334) 3 [5.289]	2.609(.406) 4 [6.419]

TABLE IV.1 -- Continued

Louisiana -- Group I

Estimated Parameter	1880	1890	1900	1910
C_1	1.988(.865) 3 [2.297]	2.602(.681) 2 [3.819]	2.901(.632) 4 [4.590]	2.890(.671) 6 [4.307]
C_2	2.126(.900) 2 [2.361]	2.780(.708) 1 [3.925]	3.014(.646) 2 [4.666]	3.080(.714) 3 [4.312]
C_3	2.142(.892) 1 [2.401]	2.571(.690) 5 [3.727]	3.341(.623) 1 [5.363]	3.225(.692) 1 [4.660]
C_4	1.760(.890) 6 [1.979]	2.586(.704) 4 [3.672]	2.766(.664) 6 [4.166]	2.592(.708) 7 [3.661]
C_5	1.628(.944) 7 [1.725]	2.449(.743) 7 [3.297]	2.945(.696) 3 [4.230]	3.158(.760) 2 [4.157]
C_6	1.849(.847) 4 [2.182]	2.599(.671) 3 [3.873]	2.772(.626) 5 [4.432]	3.041(.680) 4 [4.472]
C_7	1.828(.900) 5 [2.031]	2.492(.712) 6 [3.501]	2.672(.676) 7 [3.953]	2.993(.713) 5 [4.200]

TABLE IV.1 -- Continued

Texas -- Group I

Estimated Parameter	1880	1910
C_1	-.160(.830) 5 [-.193]	.404(.628) 6 [.643]
C_2	.249(.846) 2 [.295]	1.245(.658) 1 [1.893]
C_3	-.143(.924) 4 [-.155]	.571(.686) 3 [.833]
C_4	-.268(.826) 8 [-.325]	.239(.630) 7 [.380]
C_5	-.293(.836) 10 [-.350]	.180(.641) 9 [.281]
C_6	-.195(.754) 6 [-.259]	.182(.632) 8 [.288]
C_7	-.0355(1.003) 3 [-.0354]	.488(.719) 4 [.679]
C_8	-.227(1.166) 7 [-.195]	.444(.786) 5 [.565]
C_9	-.427(1.102) 11 [-.388]	.789(.769) 2 [1.026]
C_{10}	.467(.571) 1 [.817]	.126(.592) 10 [.212]
C_{11}	-.268(.240) 9 [-1.116]	.125(.579) 11 [.216]

TABLE IV. 1 -- Continued

Notes to the Group I Regressions

(1) Each column consists of the production function estimates for the indicated state in the Census year at the head of the column. The numbers in parentheses just to the right of the parameter estimates are the standard errors of the estimates; the numbers in square brackets just below the standard errors are the associated t-statistics for testing the null hypothesis that the coefficient is zero. The only exception to this is that the t-statistic reported along with the estimate of ν, the return to scale, is actually $\hat{\nu} - 1$ divided by its standard error, and hence is appropriate for testing the hypothesis that $\nu = 1$.

(2) R^2 is the multiple correlation coefficient. The F statistics with m and n degrees of freedom directly below the R^2 values test the over-all significance of the regressions.

(3) Obs. = the total number of observations (i.e., the number of counties in each state for the particular Census year).

(4) $u^{*\prime}u^*$ = the sum of squared residuals when the soil type dummy variables are included in the regression, and

$u'u$ = the sum of squared residuals when the soil type dummy variables are all replaced by a single constant term in the regression. $u^{*\prime}u^*$ and $u'u$ will be used subsequently in testing the over-all significance of the coefficients of the soil type variables.

(5) The estimates of the coefficients of the soil-type dummy variables are reported for each state separately from the estimates of the input variables' coefficients, for ease in reading the tables. The numbers directly beneath the soil type coefficient estimates are

TABLE IV.1 -- Continued

the ranks by size of the respective coefficients for each state and each Census year.

B. Interpretation of the Results of the Group I Regressions

(i) Fit and a priori reasonableness. These estimates of the production function coefficients show generally an excellent fit, and estimated coefficients significantly different from zero in most cases. There are only five instances of estimated input elasticities outside the zero-to-one range, and two of these are in the same state and year. Altogether 114 input elasticities were estimated, so these a priori unreasonable estimates could easily be due to chance alone. The t-statistics associated with the estimated input elasticities are less than 2 in only 21 of the 114 possible cases. The calculated R^2 values are greater than .9 in every one of the Group I regressions. On grounds of fit and conformity to a priori expectations, the production model is very successful.

(ii) Exploitation of Labor: Appendix 4 reports the results of a sampling of the reported values of the output shares received by the factors of production in Southern agriculture after the Civil War. Every example of the shares of output received by the factors which was found during the research was recorded. This sample includes the systematic report of factor shares contained in the 1880 Census Survey of Cotton Production. The figures are not strictly comparable with each other, of course, since uniform definitions of the services rendered by each factor were not used and the carefulness of the observers varied greatly. In this sample, out of 56 observations corresponding roughly to the share of output received for labor services alone, only one lies outside the range from 1/4 to 1/2. The unweighted average of all

these observations is .415. The relative uniformity of these observations, given the wide variation in their location, point in time, factor definitions, and reliability, constitutes very strong evidence that the share received by agricultural laborers was somewhere between 1/4 and 1/2. 1/2 would seem to be the upper limit of the share of output paid for labor alone.

Examination of the Group I regression results reveals that only 3 of the 35 non-negative estimated labor input elasticities are greater than 1/2. The estimated parameters values vary somewhat from year to year, without any particular pattern, and the results are even clearer if the values of these estimates are averaged over the four Census years for each state. (See following table.) If this is done, it can be seen that the average output share received by labor if the wage had been equal to the value of labor's marginal product would have been less than 1/2 for every one of the ten states. Only Mississippi and Texas show labor input elasticities less than 1/4, and both of theirs are greater than .2. The over-all unweighted average labor input elasticity is .309, less than the over-all unweighted average of the direct observations, which was found to be equal to .415.

These findings, combined with the excellent fit and high significance of the coefficients, constitute strong support for the Competition Hypothesis. The observed sharecrop agreements on division of the product are entirely compatible with marginal product factor pricing in the labor market. If anything, the observed sharecrop shares seem to be slightly <u>greater</u> than the output shares which would have been received

TABLE IV.2

Four-Census Mean Values -- Group I Regressions

State	α	β	γ	ν
North Carolina	.345	.440	.225	1.010
South Carolina	.273	.444	.261	.978
Georgia	.412	.398	.242	1.052
Florida	.371	.171	.477	1.019
Tennessee	.297	.364	.331	.992
Alabama	.355	.568	.177	1.100
Mississippi	.229	.424	.336	.990
Arkansas	.307	.302	.376	.985
Louisiana	.290	.340	.354	.984
Texas	.210	.508	.427	1.145
Over-all unweighted average	.309	.396	.321	1.026

by labor under an institutional arrangement of perfect competition and straight wage payments. Stiglitz [6] has shown that in a competitive sharecropping model with uncertainty, deviations from ordinary marginal product factor pricing can be attributed to different risk preferences on the part of landlords and tenants, so it is possible that risk considerations led to an actual wage slightly greater than the average value of the marginal product of labor. In any case, there is no evidence that workers were paid less than the value of their marginal product in the aggregate. Even if the discrepancy between the estimated labor input elasticity and the actual observed labor share remains unexplained, the fact that the competitive labor share is less than the actual share only strengthens the argument for rejection of the Exploitation Hypothesis.

It is worth repeating that these conclusions apply only to the labor market. They say nothing about possible exploitation of the agricultural workers by monopolistic furnishing merchants, or about the equity of the distribution of the factors of production among the various classes. Nevertheless, the lack of imperfection in the labor market is important, and may have constituted the chief economic benefit of abolition to the freedmen. Also, marginal product factor pricing is not quite synonymous with perfect competition. Competition is the simplest mechanism by which marginal product factor prices are achieved. But strictly speaking, competition has only been hypothesized to bring about this equilibrium wage rate within the counties described by the production functions. There is no guarantee that wage rates were equalized over more extensive areas, though there is no evidence against

such an outcome, either. The size of the effective labor markets remains to be determined.

(iii) Returns to scale. These results can also be used to test the hypothesis of constant returns to scale. The sum of the estimated values of the coefficients, minus the expected value of the sum, divided by the sample standard error of the sum will be distributed as t with the same degrees of freedom as the t statistics for the individual coefficients [7]. The Group I tables show these test statistics for the null hypothesis that $\nu = 1$ for each production function.

It should be recalled that the estimation process did not constrain the returns to scale at all--ordinary least squares was simply applied to the input and output data. Nevertheless, 17 out of 34 calcaulted values of ν were greater than one, while 17 were less than one. (The returns to scale parameter ν was not calculated if any of the input elasticities lay outside the zero to one range.) The test statistic for the null hypothesis that $\nu = 1$ is greater than 2 in absolute value in only 5 out of the 34 cases, and is greater than one in absolute value in only 12 of 34 cases.

Support for the hypothesis of constant returns to scale is also provided by the 4-Census state averages. Average returns to scale are greater than one for 5 states, less than one for 5 states. The over-all unweighted average returns to scale differs from 1 by only 2.6%. In short, there is no indication that the agricultural production functions exhibited anything other than constant returns to scale over-all.

While it is true that constant returns is required for meaningful aggregation, and therefore also for estimation of the production functions from the county data, the finding that the unconstrained estimates show constant returns is not vacuous. If the estimated returns to scale had been substantially different from one, it would show that some sort of discordance existed between the data and the assumptions required for aggregation and estimation. The constant returns of the estimated functions cannot prove the assumption of constant returns required to derive them, but finding constant returns in the unconstrained estimates does in a sense vindicate the assumption. The data are not inconsistent with the assumption of constant returns.

(iv) Soil fertility parameters. The results can be used to determine whether the Hilgard soil type classifications represented by the S_i dummy variables do in fact correspond to soils of different intrinsic fertilities. Two questions need to be answered: (a) Does inclusion of the dummy variables significantly decrease the unexplained variance in each regression compared to regressions including only a single constant? (b) Do the coefficients of the S_i maintain a stable relationship to each other in successive Census years? In other words, does their over-all significance (if such is found) follow from fertility differences, or is it due to some transitory county differences not connected at all to the composition of the soil?

The first of these two questions can be answered by performing a series of Chow-type F-tests on the over-all significance of the coefficients of the dummy variables, as compared to a single constant [8]. In a general

model where the S_i's are the soil-type dummy variables and X represents the vector of all the other independent variables, with the relation between the variables given (except for the disturbance) by

$$Y = X\beta_1 + S_1\beta_{21} + S_2\beta_{22} + S_3\beta_{23} + \ldots + S_N\beta_{2N} \tag{4-25}$$

Recall that, by definition

$$S_N = 1 - \sum_{i=1}^{N-1} S_i \tag{4-26}$$

Then

$$Y = X\beta_1 + S_1\beta_{21} + S_2\beta_{22} + \ldots + (1 - \sum_{i=1}^{N-1} S_i)\beta_{2N} \tag{4-27}$$

$$= X\beta_1 + \beta_{2N} + S_1(\beta_{21} - \beta_{2N}) + S_2(\beta_{22} - \beta_{2N}) + \ldots + S_{N-1}(\beta_{2,N-1} - \beta_{2N})$$

So let $\beta_{2N} = C$. To test the hypothesis that the remaining N-1 coefficients of $S_1, S_2, \ldots, S_{N-1}$ are different from zero, compute

$$F(m,n) = \frac{(u'u - u^{*\prime}u^*)/(N-1)}{u^{*\prime}u^*/Z - (k+N-1)} \tag{4-28}$$

where

k = the number of variables in X plus one, N = number of soil types, Z = number of observations, m = N-1, n = Z-(k+N-1), u'u is the sum of squares of the residuals from a regression in which the coefficients of $S_1, \ldots, S_{N-1}$ are restricted to be zero, and $u^{*\prime}u^*$ is the sum of squares of residuals from the regression in which these coefficients are not all restricted to zero. These F values are tabled below.

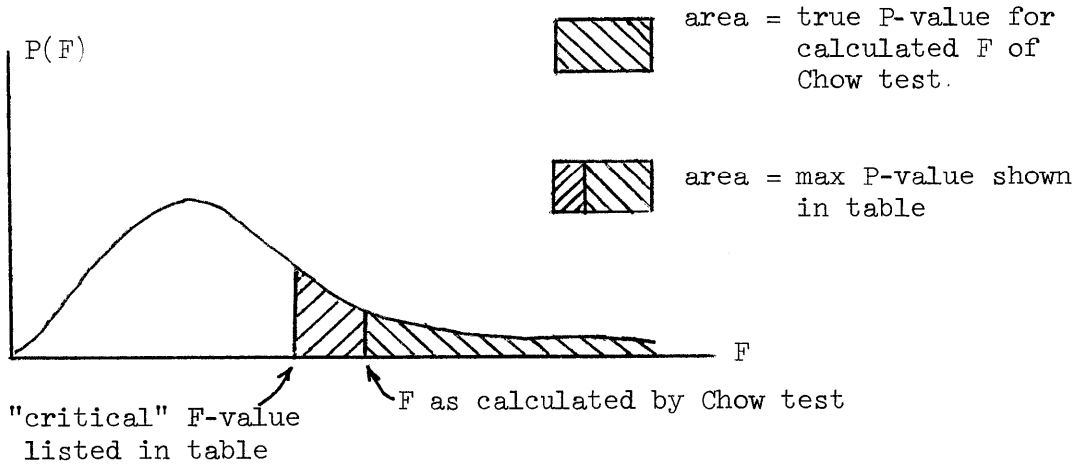
TABLE IV.3

F-test on Over-all Significance of Coefficients of S_i as Compared to a Single Constant -- Group I Regressions

State	1880	1890	1900	1910
North Carolina	1.735(3,84)	1.398(3,86)	5.053(3,86)	4.716(3,82)
max. P-value	.25	.50	.005	.01
South Carolina	2.103(4,22)	3.636(4,24)	10.662(4,28)	24.725(4,29)
	.25	.025	.001	.001
Georgia	3.807(7,121)	1.932(7,119)	4.563(7,118)	19.467(7,128)
	.001	.10	.001	.001
Florida	4.684(3,30)	1.897(3,35)	5.311(3,32)	2.865(3,34)
	.01	.25	.005	.10
Tennessee	6.185(11,75)	6.219(11,75)	3.395(11,75)	9.773(11,74)
	.001	.001	.005	.001
Alabama	2.203(8,51)	11.857(8,49)	2.315(8,49)	5.002(8,49)
	.05	.001	.05	.001
Mississippi	.540(8,60)	6.406(8,61)	6.065(8,61)	10.729(8,63)
	.90	.001	.001	.001
Arkansas	2.510(5,62)	1.686(5,63)	1.654(5,63)	6.887(5,61)
	.05	.25	.25	.001
Louisiana	1.475(6,45)	1.567(6,46)	3.925(6,46)	2.297(6,45)
	.25	.25	.005	.10
Texas	1.060(10,206)			1.582(10,218)
	.50			.25

TABLE IV.3 -- Continued

Note to the F-test table: The number listed below each F value in the table is a P-value which is at least as large as the area under the appropriate F distribution to the right of the tabled F value. The exact P-values were not given because the F tables used [9] gave only the "critical" F values for P-values equal to .75, .50, .25, .10, .05, .025, .01, .005, and .001.



If the proper degrees of freedom were not listed in the table, the max P-value was again chosen to be at least as large as the true P-value.

In most cases, the test statistic is significant at the 5% level, but even more pertinent is the significance of the four F values for each state taken together. The cumulative area under any continuous probability density function is uniformly distributed over the interval 0 to 1 [10]. For each of the F-statistics, the cumulative distribution function equals 1 - P-value. It can be shown (see Appendix 6) that if ξ = the sum of the P-values for the four test statistics of each state, the probability that $\xi < 1$ will be less than .05. Consulting the table, $\xi < 1$ for all nine states that have four test statistics. Hence, the results of the Chow tests show that over the entire period, the soil-type dummy variables were more significant as a group than a single constant for every state but Texas.

However, examination of the coefficients of the S_i in successive census years reveals a certain amount of fluctuation in the relative rankings of those coefficients. In order to determine the degree of stability in the relative rankings, a Friedman two-way analysis of variance by ranks [11] was performed. This test determines the probability that the ranks of the C_i (for a given state) were drawn from the same population over the four census years. The null hypothesis is that there was no stable ranking of coefficients, so that in each census year, the likelihood that a given C_i would have a high rank was the same as the probability that it would have a low rank. Hence the mean rank of each C_i over the four censuses should be the same under the null hypothesis.

The test statistic is

$$\chi_r^2 = \frac{12}{Nk(k+1)} \sum_{j=1}^{k} (R_j)^2 - 3N(k+1)$$

where

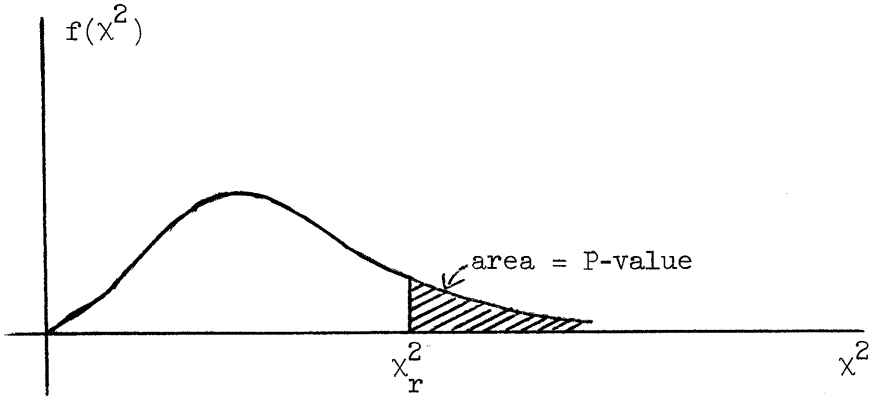
k = the number of soil types

N = 4, number of census years--1880, 1890, 1900 and 1910.

R_j = sum of ranks for soil type j coefficient over the four census years.

The statistic χ_r^2 is distributed approximately as chi-square with k-1 degrees of freedom. The values of χ_r^2 with appropriate degrees of freedom, and their associated P-values, are listed below:

State	χ_r^2(d.f.)	P-value
North Carolina	$\chi^2(3) = 3.90$	between 0.1 and 0.5, .34 by interpolation
South Carolina	$\chi^2(4) = 12.60$	< .025
Georgia	$\chi^2(7) = 22.17$	< .005
Florida	$\chi^2(3) = 9.30$	< .05
Texas	$\chi^2(11) = 39.92$	< .005
Alabama	$\chi^2(8) = 16.07$	< .05
Mississippi	$\chi^2(8) = 17.07$	< .05
Arkansas	$\chi^2(5) = 11.43$	< .05
Louisiana	$\chi^2(8) = 12.64$	< .05
Texas	$\chi^2(10) = 11.82$	between 0.5 and 0.1, .35 by interpolation



These low P-values are sufficient to reject the null hypothesis of no rank-stability at the .05 level in 8 of the 10 states, and certainly do not support the null hypothesis in the other two cases. Furthermore, the largest P-value is for Texas, which provided only a pair of coefficient rankings to base the test upon, rather than the four sets of rankings in the other states. All in all, the situation here is similar to that in the case of the F-tests on the over-all significance of the coefficients; the evidence is sufficient to reject the null hypothesis in most cases, and is certainly not favorable to the null hypothesis in the remainder. This preponderance of evidence suggests that indeed the soil type categories corresponded to soils of different net fertilities, and that these differences persisted in a stable pattern over the 40-year period under consideration.

The S_i coefficients are always described as measuring the "net fertility" or the "net residual fertility" of the Hilgard soil types. This is because the specification of the production function with race-

and crop-associated productivity differences may result in some soil-type fertility differences being measured by the coefficients of the B/R and H/T variables, not by the S_i coefficients. For example, if cotton were systematically planted on the more fertile soils, then c-d, the coefficient of H/T, would tend to be positive. Thus the different suitability of the Hilgard soil types for the more productive cotton culture would not necessarily be measured by the S_i coefficients. Similarly, if members of one race were systematically located on better lands, this would influence the measured difference in race-associated productivity, b-a, and the soil fertility differences associated with race might not show up clearly in ranking the estimated coefficients of the S_i. In short, there is a problem of identification in determining whether productivity differences associated with crop and/or race are due to soil fertility differences or to other sources. Because of this identification problem, the relative fertility of cotton soils, for example, cannot be determined by correlating the percentage of acres in cotton with soil type coefficient for the cross-section of counties, since the soil type coefficients measure fertility net of possible crop-associated fertility differences.

(v) Crop-associated productivity differences. The estimated coefficient of H/T, the proportion of improved acres devoted to cotton, provides information on the relative output of cotton land compared to other improved land, ceteris paribus. Referring back to the development of (4.15), the coefficient of H/T is $\frac{\beta}{c_o}(c - d)$. Since there is no way to know a priori the value of c_o, the starting point for the Taylor series expansion,

there is no meaningful way to compare the magnitudes of these coefficients either across states or over time. The parameters c and d include an unknown amount of "scaling," and there is no constraint forcing the scale to be the same across states or over different census years. Hence the maximum amount of information that can be recovered from the coefficient is the sign of the difference c - d, and whether or not this difference is significantly different from zero. Even with these limitations, the results of the Group I regressions are unambiguous. All 38 estimated coefficients of H/T are positive. The t-statistics of these estimates are greater than 2 in 28 out of 38 cases. Clearly there was a productivity advantage associated with cotton growing.

These results are contrary to the hypothesis that overproduction of cotton was a source of poverty and agricultural distress in the South. Given the pattern of production as it actually was, cotton culture was responsible for relatively greater value of output than the alternative crops or livestock products, factor inputs being equal. To sustain the "overproduction" hypothesis, it would be required for the cotton farmers to have been able to produce <u>even more</u> output had they switched to other crops. Suppose the cotton productivity advantage were due entirely to cotton's being produced on the better lands. It might have been the case that the farmers on those lands could have produced a greater value of output had they diversified. More likely, however, is the notion that land was good land partly because it was <u>cotton</u> land; that is, because it could be planted in the valuable staple.

It is not possible to test directly the association of cotton with soil fertility because the difference between parameters c and d may partly reflect a fertility difference, hence the coefficients of the soil type variables S_i measure only net fertility. However, if diversification would have produced even more value of output than cotton culture, a positive association between cotton concentration and net residual fertility would be expected. If cotton were concentrated in fertile counties, and if farmers had been able to realize more output from cultivation of the alternative crops and livestock in these counties, then cotton should appear to have been concentrated in the counties of greatest net residual fertility. Cultivators of the alternative crops in the cotton counties should have been generally more productive than cultivators of the alternative crops in non-cotton counties.

Instead there appears to be no association between cotton concentration and net residual fertility. The difference between the average proportion of acres planted to cotton in the counties with greatest net residual fertility, and the average proportion of acres planted to cotton in the counties with lowest net residual fertility, is positive in 19 out of 38 possible cases, and negative in 19 out of 38 cases. (See Appendix 5 for the details of these calculations.) That is, cotton acres were not concentrated in the counties of greatest net residual fertility as measured by the S_i coefficients. In addition, this difference in mean proportion of cotton acres between the residually "best" and "rest" of the counties as measured by the C_i is not statistically significant in any states but North Carolina, Tennessee, and Florida, none of which

was an important cotton-producing state. The overproduction hypothesis would seem to require an involved and intricate justification in order to be brought into accord with the results.

A preferable explanation of the observed productivity advantage is simply that cotton was well-suited for Southern conditions. The agricultural population may have accumulated special skills in cotton production over the years. Even more likely, certain Southern soils and the climate may have been ideal for cultivation of a crop in great demand. The positive values of the parameter difference c - d are, in this view, nothing but a reflection of these advantages of cotton reflected in the amount of dollar output from the agricultural sector.

Clearly such an explanation implies that rational farmers would have been motivated to concentrate even more heavily in cotton production, if there were no scarcities, bottlenecks, or other limitations preventing them from doing so. There is some evidence that such a trend actually did take place, but was weak and not universal. For example, over the entire South the proportion of improved acres planted to cotton increased with each census from 1880 to 1910. Texas was being opened to settlement during this period, and grew tremendously in improved acres, but even more in cotton acres. When Texas is excluded the share of improved acres in cotton increased from 1880 to 1910, but fell in 1900 from its 1890 high. Disaggregating, North Carolina, South Carolina, Georgia, Alabama and Texas displayed an over-all increase in proportion of improved acres in cotton, while Florida, Tennessee, Mississippi, Arkansas and Louisiana showed a decrease. Out of 30 possible increases

or decreases in this proportion from one census year to the next, it increased in 16 instances. Finally, in a subsequent chapter cotton supply functions are estimated in which the share of acres in cotton compared to total acres in all crops is the dependent variable. The supply functions cover the period 1883-1914, and include a pure trend term. The coefficient of this trend is positive in 7 of the 10 states. All in all, the evidence for increasing specialization in cotton is inconclusive. There was surely no overwhelming shift out of other crops into cotton.

The South's failure to specialize completely is evidence that the cotton productivity advantage was due to the location in the South of some factor which could not be increased easily. If the productivity advantage was due to the existence of good cotton-growing land in the South, then over time there would be a tendency to increase the proportion of acres devoted to cotton, in order to capture the greater returns available in cotton compared to other crops. Counteracting this tendency would be the fact that the best cotton lands would have been settled first, given the long-standing brisk demand for cotton and consequent profitability of the staple back even to the pre-war years. Hence, as the expansion of improved acres went on, a relatively lower proportion of those lands would be suitable for cotton culture than of the lands already improved by 1880. The outcome of these two conflicting tendencies is impossible to predict, and probably accounts for the mixed behavior of the over-all proportion of cotton acres over time and within each state.

TABLE IV.4

Statewide Values of H/T

State	1880	1890	1900	1910	4-year Averages	Sign of Trend in Cotton Supply Function
North Carolina	.138 9	.147 9	.121 9	.145 8	.138 9	+
South Carolina	.330 3	.378 2	.359 3	.419 1	.372 2	+
Georgia	.319 4	.349 4	.331 5	.397 2	.349 4	+
Florida	.259 7	.198 7	.147 8	.146 9	.188 8	-
Tennessee	.085 10	.080 10	.061 10	.072 10	.075 10	+
Alabama	.365 2	.359 3	.370 2	.385 3	.370 3	+
Mississippi	.404 1	.421 1	.382 1	.377 4	.396 1	-
Arkansas	.290 6	.311 6	.236 7	.267 6	.276 6	+
Louisiana	.316 5	.336 5	.295 6	.181 7	.282 5	-
Texas	.172 8	.190 8	.356 4	.363 5	.270 7	+
Total	.244	.257	.280	.301		
Total without Texas	.264	.282	.257	.278		

Note: The number below each state value of H/T is that state's rank in cotton concentration for the indicated census year.

It should be noted that Texas was really the only "frontier" state of the 10, and Texas shows the strongest increase in proportion of improved acres planted in cotton. It might be hypothesized that the reason for this is that Texas still contained virgin lands in 1880, and that the best cotton country had not all been settled. Thus, as Texas land was improved towards the end of the 19th century, the farmers responded to the strong world demand for cotton by increasing their cotton acres in proportion to other improved uses. This is only a conjecture, however.

To summarize, cotton displayed a sustained and unmistakable productivity advantage in the South over the period 1880-1910. The most plausible explanation of this is that cotton culture enjoyed a comparative advantage over the alternative agricultural activities during this period. Specialization in cotton was not complete, because some factors required for it (good cotton land most probably) could not be expanded easily. Cotton was King because it was profitable to the agricultural sector as a whole. The local furnishing merchants may have preferred cotton to the alternatives, but only because there was more money in it than in producing anything else. In all likelihood, independent farmers would have also favored concentration in cotton, provided they had access to land suitable for its cultivation. Again, these results say nothing about the distribution of the profits from cotton culture among the various individuals in the agricultural sector. The crop choice decision as an issue in the exercise of monopoly power by merchants will be taken up later in Chapter VII.

(vi) Race-associated productivity differences. In contrast to the coefficient of H/T, the coefficient of B/R displays no immediate pattern. In some cases it is positive, in others negative; sometimes the difference b - a is significant, sometimes not. For reasons analogous to those given regarding the c - d difference, only the sign and significance of the difference b - a can be determined in this model, not the absolute magnitudes of the parameters b and a. The following frequencies summarize the estimates:

	+	-
b - a	17	21

	$t > 2$	$t < -2$	$\|t\| < 2$
b - a	6	8	24

No clear productivity advantage is associated with either race over the entire South. Nevertheless, it does appear that blacks were concentrated in the most fertile counties. First of all, the proportion of blacks in the total population is positively correlated with the proportion of improved acres devoted to cotton in every state and every census year except for South Carolina in 1890. (See the following table.) Second, the average proportion of blacks tended to be larger in the counties of greatest residual fertility (those counties having soil types with the largest C_i coefficients.) The table in Appendix 5 showing the

TABLE IV.5

Simple Correlation Coefficient (R^2)

Between B/R and H/T

State	1880	1890	1900	1910
North Carolina	.683	.624	.562	.597
South Carolina	.049	-.0097	.0039	.107
Georgia	.633	.551	.548	.548
Florida	.665	.481	.393	.107
Tennessee	.704	.679	.684	.665
Alabama	.836	.762	.794	.818
Mississippi	.720	.762	.709	.684
Arkansas	.862	.870	.897	.797
Louisiana	.380	.415	.511	.371
Texas	.651			.274

difference in means between $\overline{B/R}$ in the "best" counties (= μ_B) and $\overline{B/R}$ in the "rest" of the counties (= μ_R) reveals the following sign frequencies: (The indicated t ranges in the second table are for the t statistics associated with $\mu_B - \mu_R$.)

	+	-
$\mu_B - \mu_R$	29	9

	$t > 2$	$t < -2$	$\lvert t \rvert < 2$
$\mu_B - \mu_R$	23	2	13

These frequencies indicate that blacks were concentrated in the counties of greatest residual fertility.

In addition to the pattern of blacks' being located in the cotton counties and in the counties of greatest residual fertility, there is an intra-regional pattern in the signs of the b - a coefficients. Blacks tended to be less productive than whites in the cotton belt, and more productive than whites in the border or peripheral states. This can be seen after first constructing an index of a state's concentration in cotton.

State	Four-Census Average Proportion of Improved Acres in Cotton, by Rank
Mississippi	.396
South Carolina	.372
Alabama	.370
Georgia	.349
Louisiana	.282
Arkansas	.276
Texas	.270
Florida	.188
North Carolina	.138
Tennessee	.075

These states fall into three rough groups. Mississippi, South Carolina, Alabama, and Georgia, all east of the Mississippi River, clearly showed concentration in cotton; Florida, North Carolina, and Tennessee were "peripheral" both in location and in cotton production. It is not clear whether Louisiana, Arkansas and Texas belong to one group or the other, and these are grouped as "intermediate" states. The frequencies of the signs of b - a for each of these groups of states are as follows:

	+	-	
East of Miss. River Cotton States	3	13	Pr = .0106
Intermediate States	6	4	Pr = .3770
Eastern Periphery	8	4	Pr = .1938

Under the null hypothesis that the sign of b - a is a random variable with equal probability of being positive or negative, and independent within states and over time, the probabilities of the observed sign frequencies or ones more unbalanced are given by the cumulative binomial distribution. These probabilities are listed to the right of each frequency table. The low probabilities under the null hypothesis for the East of the Mississippi Cotton States and Periphery, combined with the different balance of signs between those two regions, are suggestive of a systematic variation in the sign of b - a according to region.

A stronger test can be performed if the number of intra-regional groups are decreased. On purely geographical grounds, Texas is more a peripheral state than a cotton belt state, and in addition, its average proportion of improved acres in cotton was the lowest of the intermediate states. On casual grounds a priori, it seems reasonable to group Louisiana and Arkansas with the rest of the cotton belt states. If these assignments are made, the sign pattern in a 2 X2

contingency table is even more striking:

Region	Sign of b - a: +	-
Cotton Belt (South Carolina, Georgia, Alabama, Mississippi, Arkansas, Louisiana)	7	17
Periphery (North Carolina, Florida, Texas, Tennessee)	10	4

A Fisher Exact Probability Test can be used to test the null hypothesis that there is no systematic association between region and the sign of b - a [12]. The probability of observing a particular set of frequencies in a 2 X 2 table, when the marginal totals are regarded as fixed, is given by the hypergeometric distribution. The Fisher test consists of calculating the probabilities of the observed frequency distribution or one more extreme, keeping the marginal totals fixed; that is, of

7	17	or	6	18	or	5	19	or	4	20	or	3	21
10	4		11	3		12	2		13	1		14	0

This probability is

$$P = \frac{24!\ 14!\ 17!\ 21!}{38!\ 7!\ 17!\ 10!\ 4!} + \frac{24!\ 14!\ 17!\ 21!}{38!\ 6!\ 18!\ 11!\ 3!} + \frac{24!\ 14!\ 17!\ 21!}{38!\ 5!\ 19!\ 12!\ 2!}$$

$$+ \frac{24!\ 14!\ 17!\ 21!}{38!\ 4!\ 20!\ 13!\ 1!} + \frac{24!\ 14!\ 17!\ 21!}{38!\ 3!\ 21!\ 14!\ 0!}$$

$$= .0120 + .0017 + .0001 + .0000 + .0000, \text{ to four places}$$

$$= .0138$$

This probability value is extremely low, and justifies rejection of the null hypothesis of no association between the sign of b - a and region, with as low as 2% probability of a Type I error.

The same test performed for only those values of b - a which have associated t-statistics greater than 2 yields the same result:

Region	b - a: $t > 2$	$t < -2$	$\lvert t \rvert < 2$
Cotton Belt	3	8	13
Periphery	4	0	10

The probability of the significant portion of this table under the null hypothesis of no association between the sign of b - a and region is given by

$$P = \frac{11!\ 4!\ 7!\ 8!}{15!\ 3!\ 8!\ 4!\ 0!} = .0256$$

which again is very low.

Individually the states conform reasonably well to this pattern. The estimate of b - a is positive in a majority of the four census years in North Carolina, Tennessee, Louisiana, and Texas; it is negative in a majority of the years in South Carolina, Georgia, Florida, Alabama, Mississippi, and Arkansas. Florida is an exception to the regional pattern, but Florida was not an important cotton state. The other exception, Louisiana, belonged to the "intermediate" group of states with proportion of improved acres in cotton in the middle of the range for the 10 states.

The conclusion seems inescapable. Whites appear to have been more productive over-all than blacks in the cotton belt, but less productive over-all than blacks in the peripheral states.

This result, combined with the previous results, suggests a paradox. Consider the following findings:

(a) Cotton was more productive in value terms than the alternative agricultural outputs.

(b) Blacks were concentrated on the cotton lands, as well as on the lands of greatest residual fertility.

(c) Nevertheless, blacks appear less productive than whites in

the cotton belt, but more productive than whites in the peripheral states.

How can these findings be reconciled? If blacks were concentrated on cotton lands, and if cotton lands tended to be more fertile than the lands devoted to other crops, why does the coefficient b - a not reflect some of this locational advantage? It must be kept in mind that the parameters a and b reflect race-associated productivity differences. If blacks were concentrated on more fertile lands than whites, this advantage could just as easily appear as a positive b - a value as could a black productivity advantage based on a difference in skill. The identification problem cannot be escaped; the parameters a, b, c, and d measure only productivity differences, not the source of the productivity differences.

Similarly, if the black/white differences were due to the "legacy of slavery" manifested in lower productivity of black workers because of deprivation in education, entrepreneurship, or initiative, why should there be a regional pattern to the black/white productivity difference? Did the "legacy of slavery" weigh heavier on the freedmen in the deep South than in the border states?

The results are too strong to be ignored, yet these are real problems of interpretation. In particular, the identification problem cannot be surmounted with the given specification of the production function. In order to confront this identification problem explicitly, it is possible to modify the production function to recognize the systematic association of race and crop.

NOTES TO CHAPTER IV

[1] Production functions for Texas in 1890 and 1900 were not estimated because the census tabulations of the Texas county cross-sections in those two years were extremely difficult to code in a form suitable for machine processing. Virginia was not included in the sample of states because by 1880 hardly any cotton was grown there.

[2] For a discussion of these difficulties, see Marc Nerlove, Estimation and Identification of Cobb-Douglas Production Functions, (Chicago: Rand McNally & Company, 1965; Amsterdam: North-Holland Publishing Company, 1965), 157-190.

[3] But see Appendix 8 on the essential arbitrariness of this breakdown of the data into manageable samples.

[4] The assumptions made about the disturbance term allow consistent estimation of the production function parameters from the input and output data. If uncertainty were eliminated (set $u_o = E(u_o)$), the "production function" remaining would have the same parameters as (4-1) but it would contain no random disturbance. (Even the constant terms would be the same, since $E(u_o) = 0.$) Thus discussion of the distributional properties of the production function omitting the disturbance term corresponds to exploring the properties of the model in the absence of uncertainty, which is exactly what the objective of the investigation is.

[5] George B. Thomas, Calculus and Analytic Geometry, Second edition (Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1951, 1953), 603.

[6] Joseph E. Stiglitz, "Incentives and Risk-Sharing in Sharecropping," (mimeographed).

[7] J. Jonston, Econometric Methods (New York: McGraw-Hill Book Company, Inc., 1963), 131-135.

[8] Franklin M. Fisher, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions: An Expository Note," Econometrica, Vol. 38, No. 2 (March, 1970) contains a particularly useful method for carrying out the Chow test. Fisher's development is followed here.

[9] F. James Rohlf and Robert R. Sokal, Statistical Tables (San Francisco: W.H. Freeman and Company, 1969), Table S: "Critical values of the F-distribution," 168-167.

[10] Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics (Second Edition), (New York: The Macmillan Company, 1965), 178.

[11] Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Company, Inc., 1956), 166-172.

[12] Ibid., 96-104.

V. A MODIFICATION OF THE PRODUCTION FUNCTION

The natural generalization of the production function of the previous chapter is to allow productivity differences between members of the same race, depending on which crop is grown, as well as fertility differences for the lands devoted to each crop, depending on the race of the farmers working them [1]. Such a production function, still of the generalized Cobb-Douglas type, is

$$\log Q = \left(\sum_{i=1}^{N} A_i S_i\right) + \alpha \log (a_1 W_1 + a_2 W_2 + b_1 B_1 + b_2 B_2) + \beta \log (c_1 H_1 + c_2 H_2 + d_1 J_1 + d_2 J_2) + \gamma \log K \qquad (5\text{-}1)$$

where

W_1 = white labor devoted to growing cotton

W_2 = white labor devoted to growing non-cotton alternative crops

B_1 = black labor devoted to growing cotton

B_2 = black labor devoted to growing non-cotton alternatives

H_1 = cotton acres farmed by whites

H_2 = cotton acres farmed by blacks

J_1 = other improved acres farmed by whites

J_2 = other improved acres farmed by blacks

Q = value of output not fed to livestock

S_i are the soil type dummy variables, and

K = agricultural capital input.

Next, write $W_1 + W_2 = W$; $B_1 + B_2 = B$; $H_1 + H_2 = H$; $J_1 + J_2 = J$; $W + B = R$ and $H + J = T$. W, B, H, and J are all observable, i.e., are reported for each county in the census.

Unfortunately, W_1, W_2, B_1, B_2, H_1, H_2, J_1 and J_2 are not observed. But it probably would not be too far wrong to assume that

$$W_1 \cong (H/T)W \tag{5-2}$$

that is, the number of whites growing cotton was roughly the total number of whites times the proportion of total land in cotton, with a similar relationship holding true for the other unobservable variables. To preserve generality, however, introduce a new set of "predilection" parameters k_i, l_i, m_i, and n_i such that

$$W_1 = k_1 \frac{H}{T} W \; ; \quad W_2 = k_2 \frac{J}{T} W ; \quad B_1 = l_1 \frac{H}{T} B ; \quad B_2 = l_2 \frac{J}{T} B \tag{5-3}$$

$$H_1 = m_1 \frac{W}{R} H \; ; \quad H_2 = m_2 \frac{B}{R} H ; \quad J_1 = n_1 \frac{W}{R} J : \quad J_2 = n_2 \frac{B}{R} J \tag{5-4}$$

These parameters express the "predilection" of whites to grow cotton, whites to grow alternative crops, blacks to grow cotton, etc. Not all these new parameters are independent. Since

$$k_1 \frac{H}{T} W + k_2 \frac{J}{T} W + l_1 \frac{H}{T} B + l_2 \frac{J}{T} B = R \tag{5-5}$$

and

$$m_1 \frac{W}{R} H + m_2 \frac{B}{R} H + n_1 \frac{W}{R} J + n_2 \frac{B}{R} J = T \tag{5-6}$$

it follows that

$$k_1 \frac{HW}{RT} + k_2 \frac{JW}{RT} + l_1 \frac{HB}{RT} + l_2 \frac{JB}{RT} \tag{5-7}$$

$$= m_1 \frac{WH}{RT} + m_2 \frac{BH}{RT} + n_1 \frac{WJ}{RT} + n_2 \frac{BJ}{RT}$$

or

$$\frac{WH}{RT}(k_1 - m_1) + \frac{WJ}{RT}(k_2 - n_1) + \frac{BH}{RT}(l_1 - m_2) + \frac{BJ}{RT}(l_2 - n_2) = 0 \tag{5-8}$$

The only way this expression can be equal to zero whatever the values of R,T,B and H (remembering that these four values will determine W and J as well) is if $k_1 = m_1$, $k_2 = n_1$, $l_1 = m_2$ and $l_2 = n_2$. The production function can now be written

$$\log Q = \left(\sum_{i=1}^{N} A_i S_i\right) + \alpha \log \left(a_1 k_1 \frac{H}{T} W + a_2 k_2 \frac{J}{T} W + b_1 l_1 \frac{H}{T} B + b_2 l_2 \frac{J}{T} B\right)$$

$$+ \beta \log \left(c_1 m_1 \frac{W}{R} H + c_2 m_2 \frac{B}{R} H + d_1 n_1 \frac{W}{R} J + d_2 n_2 \frac{B}{R} J\right) + \gamma \log K \qquad (5\text{-}9)$$

Obviously a_1 and k_1, a_2 and k_2--in fact all of the efficiency and predilection or fertility and predilection parameter pairs--are not separately distinguishable in this form. It remains useful to write both of them for convenience in the discussion.

Linearizing this production function in Taylor series around $a_0 k_0 = a_{10} k_{10} = a_{20} k_{20} = b_{10} l_{10} = b_{20} l_{20}$ for the labor term and $c_0 m_0 = c_{10} m_{10} = c_{20} m_{20} = d_{10} n_{10} = d_{20} n_{20}$ for the land term yields

$$\log Q = \sum_{i=1}^{N} B_i S_i + \alpha \log R + \beta \log T + \gamma \log K$$

$$+ \frac{\alpha a_1 k_1}{a_0 k_0} \frac{H}{T} \frac{W}{R} + \frac{\alpha a_2 k_2}{a_0 k_0} \frac{J}{T} \frac{W}{R} + \frac{\alpha b_1 l_1}{a_0 k_0} \frac{H}{T} \frac{B}{R} + \frac{\alpha b_2 l_2}{a_0 k_0} \frac{J}{T} \frac{B}{R} +$$

$$\frac{\beta c_1 m_1}{c_0 m_0} \frac{W}{R} \frac{H}{T} + \frac{\beta c_2 m_2}{c_0 m_0} \frac{B}{R} \frac{H}{T} + \frac{\beta d_1 n_1}{c_0 m_0} \frac{W}{R} \frac{J}{T} + \frac{\beta d_2 n_2}{c_0 m_0} \frac{B}{R} \frac{J}{T} \qquad (5\text{-}10)$$

Consider only the last two lines of this expression. Collect terms and eliminate dependencies. The last two lines become

$$\frac{\alpha a_1 k_1}{a_0 k_0}\frac{H}{T}\frac{(R-B)}{R} + \frac{\alpha a_2 k_2}{a_0 k_0}\frac{(T-H)}{T}\frac{(R-B)}{R} + \frac{\alpha b_1 l_1}{a_0 k_0}\frac{H}{T}\frac{B}{R} + \frac{\alpha b_2 l_2}{a_0 k_0}\frac{(T-H)}{T}\frac{B}{R}$$

$$+ \frac{\beta c_1 m_1}{c_0 m_0}\frac{(R-B)}{R}\frac{H}{T} + \frac{\beta c_2 m_2}{c_0 m_0}\frac{B}{R}\frac{H}{T} + \frac{\beta d_1 n_1}{c_0 m_0}\frac{(R-B)}{R}\frac{(T-H)}{T} + \frac{\beta d_2 n_2}{c_0 m_0}\frac{B}{R}\frac{(T-H)}{T}$$

$$= \left[\frac{\alpha a_2 k_2}{a_0 k_0} + \frac{\beta d_1 n_1}{c_0 m_0}\right] + \left[\frac{-\alpha a_2 k_2}{a_0 k_0} + \frac{\alpha b_2 l_2}{a_0 k_0} - \frac{\beta d_1 n_1}{c_0 m_0} + \frac{\beta d_2 n_2}{c_0 m_0}\right]\frac{B}{R} \qquad (5\text{-}11)$$

$$+ \left[\frac{\alpha a_1 k_1}{a_0 k_0} - \frac{\alpha a_2 k_2}{a_0 k_0} + \frac{\beta c_1 m_1}{c_0 m_0} - \frac{\beta d_1 n_1}{c_0 m_0}\right]\frac{H}{T}$$

$$+ \left[-\frac{\alpha a_1 k_1}{a_0 k_0} + \frac{\alpha a_2 k_2}{a_0 k_0} + \frac{\alpha b_1 l_1}{a_0 k_0} - \frac{\alpha b_2 l_2}{a_0 k_0} - \frac{\beta c_1 m_1}{c_0 m_0} + \frac{\beta c_2 m_2}{c_0 m_0}\right.$$

$$\left. + \frac{\beta d_1 n_1}{c_0 m_0} - \frac{\beta d_2 n_2}{c_0 m_0}\right]\frac{B}{R}\frac{H}{T}$$

So the final form of the equation to be estimated is

$$\log Q = \sum_{i=1}^{N} C_i S_i + \alpha \log R + \beta \log T + \gamma \log K \qquad (5\text{-}12)$$

$$+ \left[\frac{\alpha}{a_0 k_0}(b_2 l_2 - a_2 k_2) + \frac{\beta}{c_0 m_0}(d_2 n_2 - d_1 n_1)\right]\frac{B}{R}$$

$$+ \left[\frac{\alpha}{a_0 k_0}(a_1 k_1 - a_2 k_2) + \frac{\beta}{c_0 m_0}(c_1 m_1 - d_1 n_1)\right]\frac{H}{T}$$

$$+ \left[\frac{\alpha}{a_0 k_0}(a_2 k_2 - a_1 k_1 + b_1 l_1 - b_2 l_2) + \frac{\beta}{c_0 m_0}(c_2 m_2 - c_1 m_1 + d_1 n_1 - d_2 n_2)\right]\frac{B}{R}\frac{H}{T}$$

The estimates of the parameters of this equation will be referred to as the Group II results.

TABLE V.1

North Carolina -- Group II

Estimated Parameter	1880	1890	1900	1910
α (s.e.)	.281(.0781)	.480(.0922)	.324(.0643)	.347(.0688)
[t]	[3.601]	[5.209]	[5.038]	[5.037]
β	.413(.0641)	.335(.111)	.504(.0780)	.515(.0730)
	[6.439]	[3.010]	[6.467]	[7.053]
γ	.291(.0657)	.243(.114)	.155(.0882)	.144(.0843)
	[4.427]	[2.132]	[1.759]	[1.706]
Coefficient of B/R	1.109(.212)	.779(.253)	.361(.179)	.531(.190)
	[5.227]	[3.084]	[2.019]	[2.791]
Coefficient of H/T	2.758(.533)	1.733(.605)	.264(.459)	1.550(.418)
	[5.173]	[2.864]	[.576]	[3.705]
Coefficient of (B/R)·(H/T)	-3.434(1.089)	-3.280(1.390)	.591(1.106)	-.633(.969)
	[-3.155]	[-2.360]	[.535]	[-.653]
ν	.985(.0444)	1.058(.0581)	.983(.0378)	1.006(.0409)
	[-.388]	[.998]	[-.450]	[.147]
R^2	.965	.924	.958	.966
F(m,n)	252.3(9,83)	115.2(9,85)	215.1(9,85)	254.7(9,81)
obs	93	95	95	91
u*'u*	2.19214	3.51969	1.68395	1.85582
u'u	2.37030	3.82705	1.94015	2.15589

TABLE V.1 -- Continued

South Carolina -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.224(.153) [1.465]	.416(.196) [2.116]	.203(.139) [1.466]	-.187(.140) [-1.336]
β	.267(.131) [2.031]	.517(.192) [2.694]	.533(.146) [3.660]	.645(.111) [5.819]
γ	.359(.101) [3.546]	.148(.163) [.909]	.230(.153) [1.502]	.448(.0932) [4.804]
Coefficient of B/R	1.061(.542) [1.956]	-.227(.845) [-.269]	-.507(.379) [-1.336]	-.491(.440) [-1.116]
Coefficient of H/T	2.415(.950) [2.541]	.905(1.400) [.647]	1.140(.714) [1.598]	1.746(.665) [2.623]
Coefficient of (B/R)·(H/T)	-2.475(1.588) [-1.559]	.0458(2.422) [.0189]	.211(1.121) [.188]	.0984(1.131) [.0870]
ν	.850(.0801) [-1.873]	1.081(.114) [.711]	.966(.0566) [-.601]	—
R^2	.971	.936	.965	.978
F(m,n)	69.02(10,21)	33.71(10,23)	74.94(10,27)	124.6(10,28)
obs	32	34	38	39
u*'u*	.256867	.592387	.239759	.186573
u'u	.347336	.923953	.597322	.783471

TABLE V.1 -- Continued

Georgia -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.546(.0600) [9.093]	.440(.0591) [7.443]	.433(.0694) [6.245]	.168(.0467) [3.604]
β	.351(.0584) [6.016]	.407(.0590) [6.897]	.402(.0715) [5.626]	.504(.0405) [12.463]
γ	.201(.0481) [4.172]	.171(.0496) [3.452]	.211(.0721) [2.921]	.351(.0454) [7.725]
Coefficient of B/R	.818(.183) [4.472]	.390(.202) [1.933]	-.0969(.165) [-.587]	-.235(.142) [-1.654]
Coefficient of H/T	2.670(.323) [8.257]	1.771(.326) [5.434]	1.133(.275) [4.123]	1.081(.200) [5.398]
Coefficient of (B/R)·(H/T)	-3.424(.588) [-5.819]	-.535(.584) [-.917]	-.532(.491) [-1.085]	.483(.357) [1.353]
ν	1.098(.0326) [3.006]	1.018(.0319) [.564]	1.046(.0283) [1.625]	1.023(.0209) [1.100]
R^2	.969	.970	.969	.986
F(m,n)	289.7(13,120)	292.4(13,118)	278.7(13,117)	705.6(13,127)
obs	134	132	131	141
u*'u*	2.40091	2.25981	1.65847	1.16542
u'u	2.72415	2.42691	1.96734	2.34433

TABLE V.1 -- Continued

Florida -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.376(.127) [2.949]	.521(.160) [3.253]	.165(.162) [1.016]	-.346(.231) [-1.500]
β	.335(.117) [2.870]	.111(.184) [.604]	.0551(.102) [.541]	.178(.149) [1.200]
γ	.203(.0787) [2.572]	.488(.144) [3.395]	.755(.119) [6.368]	1.138(.165) [6.877]
Coefficient of B/R	-.691(.508) [-1.359]	-.00444(.640) [-.00694]	-.898(.439) [-2.048]	.561(.701) [.800]
Coefficient of H/T	1.473(1.030) [1.430]	.731(1.302) [.561]	.809(1.461) [.554]	2.709(1.930) [1.403]
Coefficient of (B/R)·(H/T)	1.865(2.261) [.825]	-.913(3.316) [-.275]	3.896(2.974) [1.310]	-3.900(4.288) [-.910]
ν	.914(.0941) [-.914]	1.120(.0966) [1.242]	.975(.0920) [-.272]	—
R^2	.956	.919	.939	.917
F(m,n)	67.95(9,28)	42.71(9,34)	52.62(9,31)	40.64(9,33)
obs	38	44	41	43
u*'u*	1.58713	4.36052	1.73744	3.74942
u'u	2.27680	4.90785	2.18361	4.80509

TABLE V.1 -- Continued

Tennessee -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.398(.113) [3.515]	-.0324(.0646) [-.502]	.247(.0631) [3.917]	.238(.0618) [3.856]
β	.154(.125) [1.228]	.661(.0860) [7.694]	.511(.0727) [7.030]	.471(.0819) [5.745]
γ	.406(.0954) [4.261]	.337(.0702) [4.801]	.226(.0704) [3.216]	.312(.0754) [4.138]
Coefficient of B/R	.341(.260) [1.310]	.284(.205) [1.390]	-.0695(.212) [-.329]	.298(.253) [1.181]
Coefficient of H/T	1.549(.529) [2.928]	.520(.356) [1.460]	.691(.453) [1.525]	.565(.453) [1.249]
Coefficient of (B/R)·(H/T)	-.469(1.076) [-.436]	-.0869(.790) [-.110]	-.567(.919) [-.617]	-1.077(.977) [-1.102]
ν	.958(.0361) [-1.163]	—	.984(.0283) [-.565]	1.021(.0305) [.689]
R^2	.978	.984	.980	.980
F(m,n)	196.7(17,74)	264.8(17,74)	208.8(17,74)	210.1(17,73)
obs	92	92	92	91
u*'u*	1.34395	.792645	.834327	1.02892
u'u	2.32767	1.44126	1.19037	2.35344

TABLE V.1 -- Continued

Alabama -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.765(.123) [6.199]	.431(.102) [4.272]	.443(.0829) [5.339]	.197(.0627) [3.142]
β	.306(.101) [3.048]	.537(.0652) [8.244]	.540(.0592) [9.121]	.623(.0615) [10.124]
γ	.0282(.0825) [.342]	.161(.0713) [2.258]	.109(.0839) [1.295]	.263(.0612) [4.295]
Coefficient of B/R	.597(.401) [1.488]	-.0229(.309) [-.0741]	-.302(.209) [-1.443]	-.352(.192) [-1.830]
Coefficient of H/T	2.447(.509) [4.807]	1.176(.393) [2.993]	1.007(.295) [3.412]	1.284(.340) [3.778]
Coefficient of (B/R)·(H/T)	-2.314(1.049) [-2.206]	-.264(.830) [-.318]	.0511(.542) [.0943]	-.296(.513) [-.577]
ν	1.099(.0663) [1.493]	1.129(.0619) [2.084]	1.092(.0434) [2.120]	1.083(.0407) [2.039]
R^2	.976	.982	.984	.979
F(m,n)	144.7(14,50)	182.6(14,48)	210.8(14,48)	157.2(14,48)
obs	65	63	63	63
u*'u*	.928375	.522949	.250216	.208466
u'u	1.06562	1.47770	.324767	.309178

TABLE V.1 -- Continued

Mississippi -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.223(.105) [2.115]	.112(.110) [1.020]	.356(.0529) [6.738]	.230(.0600) [3.834]
β	.286(.0998) [2.862]	.679(.117) [5.824]	.338(.0475) [7.106]	.414(.0605) [6.840]
γ	.530(.0819) [6.480]	.148(.107) [1.384]	.301(.0666) [4.528]	.350(.0773) [4.532]
Coefficient of B/R	.103(.533) [.193]	.531(.380) [1.399]	-.156(.195) [-.798]	-.491(.248) [-1.979]
Coefficient of H/T	2.219(.836) [2.654]	.750(.623) [1.204]	.917(.332) [2.759]	1.220(.370) [3.300]
Coefficient of (B/R)·(H/T)	-.898(1.232) [-.729]	.147(.865) [.170]	.0975(.506) [.193]	.503(.638) [.788]
ν	1.039(.0713) [.547]	.939(.0651) [-.937]	.995(.0288) [-.174]	.994(.0338) [-.178]
R^2	.959	.960	.989	.990
F(m,n)	98.78(14,59)	102.4(14,60)	368.6(14,60)	422.0(14,62)
obs	74	75	75	77
u*'u*	2.87837	2.07385	.355703	.486083
u'u	3.10534	3.81516	.616220	1.05682

TABLE V.1 -- Continued

Arkansas -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.455(.0882) [5.157]	.307(.106) [2.908]	.273(.104) [2.628]	.239(.103) [2.319]
β	.286(.0864) [3.310]	.312(.0917) [3.401]	.131(.113) [1.162]	.377(.0891) [4.237]
γ	.290(.0642) [4.526]	.309(.0665) [4.649]	.644(.104) [6.176]	.366(.0756) [4.835]
Coefficient of B/R	.572(.243) [2.355]	.281(.203) [1.385]	-.0161(.249) [-.0648]	-.454(.246) [-1.847]
Coefficient of H/T	2.620(.200) [13.102]	1.410(.175) [8.040]	1.264(.198) [6.385]	2.000(.189) [10.585]
Coefficient of (B/R)·(H/T)	-2.261(.492) [-4.593]	-.233(.344) [-.678]	-.157(.524) [-.299]	-.168(.506) [-.332]
ν	1.031(.0324) [.957]	.928(.0335) [-2.149]	1.048(.0363) [1.322]	.982(.0468) [-.385]
R^2	.968	.970	.964	.968
F(m,n)	169.2(11,61)	184.6(11,62)	152.0(11,62)	164.3(11,60)
obs	73	74	74	72
u*'u*	.624040	.591193	.569125	.627102
u'u	.953464	.672615	.627412	.926825

TABLE V.1 -- Continued

Louisiana -- Group II

Estimated Parameter	1880	1890	1900	1910
α	.300(.160) [1.873]	.394(.113) [3.489]	.314(.110) [2.855]	.210(.109) [1.933]
β	.342(.139) [2.456]	.228(.0829) [2.744]	.446(.107) [4.155]	.273(.0928) [2.945]
γ	.403(.0923) [4.370]	.375(.0623) [6.014]	.185(.0543) [3.413]	.448(.0834) [5.372]
Coefficient of B/R	1.476(.522) [2.828]	.752(.384) [1.957]	-.260(.344) [-.755]	-.323(.424) [-.762]
Coefficient of H/T	2.069(.830) [2.493]	.744(.542) [1.372]	-.406(.548) [-.740]	.523(.819) [.638]
Coefficient of (B/R)·(H/T)	-2.352(1.096) [-2.146]	-.249(.827) [-.301]	1.796(.896) [2.003]	1.388(1.607) [.864]
ν	1.045(.0935) [.481]	.997(.0751) [-.0399]	.945(.0650) [-.846]	.931(.0727) [-.949]
R^2	.924	.927	.930	.925
F(m,n)	44.65(12,44)	47.85(12,45)	50.03(12,45)	45.34(12,44)
obs	57	58	58	57
u*'u*	3.46765	2.16334	1.60968	1.74941
u'u	4.31804	2.59331	2.28250	2.29340

TABLE V.1 -- Continued

Texas -- Group II

Estimated Parameter	1880	1910
α	.154(.0764) [2.012]	.236(.0917) [2.575]
β	.315(.0685) [4.593]	.686(.0782) [8.777]
γ	.676(.0949) [7.118]	.200(.106) [1.881]
Coefficient of B/R	.979(1.224) [.800]	1.859(.929) [2.001]
Coefficient of H/T	3.133(1.913) [1.637]	2.442(.410) [5.956]
Coefficient of (B/R)·(H/T)	-2.302(4.384) [-.525]	-3.579(2.121) [-1.687]
ν	1.145(.0831) [1.745]	1.122(.0605) [2.017]
R^2	.954	.912
F(m,n)	267.6(16,205)	140.6(16,217)
obs	222	234
u*'u*	274.829	71.6597
u'u	288.995	75.6390

TABLE V.1 -- Continued

North Carolina -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1 (s.e.)	1.945(.389)	1.532(.523)	2.654(.352)	2.767(.383)
C_1 rank [t]	4 [4.997]	4 [2.931]	4 [7.538]	2 [7.225]
C_2	2.083(.418)	1.622(.565)	2.841(.380)	2.876(.412)
	3 [4.987]	3 [2.871]	1 [7.485]	1 [6.981]
C_3	2.141(.425)	1.721(.567)	2.718(.380)	2.697(.408)
	2 [5.034]	2 [3.036]	3 [7.150]	3 [6.605]
C_4	2.182(.409)	1.823(.547)	2.750(.366)	2.581(.388)
	1 [5.337]	1 [3.334]	2 [7.505]	4 [6.659]

TABLE V.1 -- Continued

South Carolina -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	3.455(.742) 5 [4.655]	1.730(1.066) 4 [1.623]	3.020(.555) 3 [5.438]	3.308(.533) 2 [6.211]
C_2	3.508(.731) 3 [4.799]	2.210(.983) 1 [2.248]	3.286(.562) 1 [5.848]	3.474(.563) 1 [6.173]
C_3	3.649(.786) 1 [4.640]	1.935(1.125) 2 [1.720]	3.109(.572) 2 [5.431]	3.267(.530) 3 [6.168]
C_4	3.465(.751) 4 [4.612]	1.684(1.080) 5 [1.560]	2.870(.561) 4 [5.113]	3.147(.528) 4 [5.959]
C_5	3.582(.783) 2 [4.572]	1.741(1.132) 3 [1.538]	2.778(.563) 5 [4.932]	2.917(.529) 5 [5.518]

TABLE V.1 -- Continued

Georgia -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	1.411(.314) 4 [4.487]	2.101(.316) 6 [6.657]	2.1242(.289) 7 [7.344]	2.162(.225) 7 [9.620]
C_2	1.446(.298) 2 [4.858]	2.041(.304) 8 [6.714]	2.1239(.278) 8 [7.646]	2.153(.212) 8 [10.162]
C_3	1.385(.313) 6 [4.424]	2.132(.318) 4 [6.696]	2.130(.288) 6 [7.404]	2.273(.222) 6 [10.241]
C_4	1.406(.311) 5 [4.527]	2.119(.315) 5 [6.726]	2.241(.296) 3 [7.571]	2.375(.226) 5 [10.505]
C_5	1.074(.329) 8 [3.260]	2.147(.335) 3 [6.411]	2.173(.316) 5 [6.877]	2.379(.241) 4 [9.877]
C_6	1.374(.304) 7 [4.513]	2.100(.312) 7 [6.734]	2.212(.296) 4 [7.480]	2.439(.227) 2 [10.751]
C_7	1.450(.290) 1 [5.000]	2.242(.300) 1 [7.470]	2.281(.284) 2 [8.040]	2.521(.221) 1 [10.402]
C_8	1.427(.280) 3 [5.088]	2.149(.289) 2 [7.426]	2.296(.265) 1 [8.675]	2.402(.211) 3 [11.362]

TABLE V.1 -- Continued

Florida -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	3.166(.843) 4 [3.757]	1.742(.951) 2 [1.831]	2.501(.852) 4 [2.936]	1.378(1.267) 4 [1.088]
C_2	3.185(.767) 3 [4.151]	1.502(.860) 4 [1.746]	2.737(.823) 3 [3.324]	1.727(1.212) 2 [1.425]
C_3	3.431(.810) 2 [4.236]	1.714(.902) 3 [1.899]	2.814(.823) 2 [3.422]	1.483(1.183) 3 [1.253]
C_4	3.707(.712) 1 [5.210]	2.030(.761) 1 [2.668]	3.129(.743) 1 [4.213]	2.115(1.111) 1 [1.904]

TABLE V.1 -- Continued

Tennessee -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	3.573(.389) 1 [9.173]	2.332(.287) 1 [8.140]	3.002(.335) 1 [8.952]	3.170(.373) 1 [8.500]
C_2	3.084(.382) 2 [8.074]	2.152(.280) 3 [7.682]	2.856(.329) 2 [8.669]	2.700(.343) 2 [7.870]
C_3	3.028(.392) 4 [7.727]	2.024(.280) 5 [7.219]	2.766(.324) 3 [8.541]	2.439(.336) 4 [7.255]
C_4	2.957(.395) 5 [7.491]	2.070(.275) 4 [7.522]	2.651(.314) 6 [8.447]	2.362(.325) 6 [7.258]
C_5	3.063(.360) 3 [8.499]	2.164(.259) 2 [8.344]	2.739(.292) 4 [9.381]	2.449(.307) 3 [7.982]
C_6	2.957(.366) 6 [8.079]	2.022(.259) 6 [7.807]	2.642(.295) 7 [8.967]	2.372(.308) 5 [7.690]
C_7	2.753(.381) 9 [7.235]	1.878(.269) 11 [6.986]	2.616(.302) 8 [8.650]	2.298(.318) 8 [7.238]
C_8	2.918(.387) 7 [7.542]	1.888(.274) 10 [6.902]	2.709(.305) 5 [8.890]	2.301(.317) 7 [7.251]
C_9	2.662(.345) 12 [7.708]	1.893(.246) 9 [7.706]	2.546(.278) 10 [9.172]	2.234(.291) 9 [7.672]
C_{10}	2.760(.368) 8 [7.502]	1.947(.258) 8 [7.538]	2.542(.289) 11 [8.794]	2.125(.306) 11 [6.947]
C_{11}	2.744(.383) 10 [7.172]	1.819(.268) 12 [6.788]	2.536(.300) 12 [8.442]	2.050(.315) 12 [6.508]
C_{12}	2.718(.377) 11 [7.216]	1.949(.266) 7 [7.316]	2.548(.301] 9 [8.471]	2.152(.318) 10 [6.773]

TABLE V.1 -- Continued

Alabama -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	1.665(.630) 2 [2.641]	1.139(.571) 5 [1.994]	1.734(.428) 3 [4.054]	1.664(.425) 4 [3.917]
C_2	1.638(.631) 4 [2.594]	1.073(.586) 6 [1.832]	1.652(.439) 6 [3.765]	1.583(.429) 7 [3.688]
C_3	1.533(.617) 9 [2.483]	.949(.568) 8 [1.672]	1.621(.432) 9 [3.754]	1.562(.433) 9 [3.611]
C_4	1.641(.637) 3 [2.578]	.779(.573) 9 [1.360]	1.632(.436) 8 [3.744]	1.610(.434) 6 [3.705]
C_5	1.721(.617) 1 [2.790]	1.062(.558) 7 [1.902]	1.737(.422) 1 [4.119]	1.574(.418) 8 [3.762]
C_6	1.540(.604) 8 [2.549]	1.171(.562) 3 [2.084]	1.693(.429) 5 [3.950]	1.668(.421) 3 [3.960]
C_7	1.585(.612) 7 [2.589]	1.269(.567) 2 [2.236]	1.718(.431) 4 [3.989]	1.709(.424) 2 [4.031]
C_8	1.608(.632) 5 [2.545]	1.144(.575) 4 [1.991]	1.644(.427) 7 [3.849]	1.630(.424) 5 [3.844]
C_9	1.601(.545) 6 [2.937]	1.361(.534) 1 [2.547]	1.735(.414) 2 [4.188]	1.733(.415) 1 [4.176]

TABLE V.1 -- Continued

Mississippi -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	1.626(.729) 8 [2.231]	2.266(.620) 9 [3.653]	2.678(.277) 9 [9.677]	2.555(.339) 8 [7.542]
C_2	1.632(.742) 7 [2.200]	2.336(.630) 8 [3.707]	2.7380(.281) 5 [9.744]	2.627(.340) 6 [7.722]
C_3	1.764(.730) 2 [2.415]	2.389(.622) 7 [3.842]	2.7382(.275) 4 [9.964]	2.769(.333) 2 [8.323]
C_4	1.701(.715) 5 [2.380]	2.650(.616) 4 [4.306]	2.720(.274) 7 [9.920]	2.602(.336) 7 [7.754]
C_5	1.590(.698) 9 [2.276]	2.641(.598) 5 [4.415]	2.789(.272) 2 [10.269]	2.418(.328) 9 [7.371]
C_6	1.723(.674) 4 [2.557]	2.800(.579) 2 [4.836]	2.972(.271) 1 [10.964]	2.934(.342) 1 [8.577]
C_7	1.733(.716) 3 [2.421]	2.531(.618) 6 [4.095]	2.707(.274) 8 [9.894]	2.726(.333) 5 [8.177]
C_8	1.696(.711) 6 [2.385]	2.753(.617) 3 [4.459]	2.747(.276) 3 [9.957]	2.739(.338) 4 [8.113]
C_9	1.857(.611) 1 [3.038]	2.936(.573) 1 [5.128]	2.730(.268) 6 [10.198]	2.769(.323) 3 [8.585]

TABLE V.1 -- Continued

Arkansas -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	2.224(.312) 1 [7.129]	3.174(.292) 1 [10.869]	1.858(.344) 1 [5.404]	2.849(.436) 1 [6.537]
C_2	2.178(.313) 2 [6.968]	3.044(.297) 4 [10.252]	1.767(.348) 2 [5.071]	2.735(.430) 2 [6.356]
C_3	1.961(.334) 6 [5.878]	3.078(.316) 2 [9.734]	1.691(.368) 6 [4.592]	2.457(.443) 6 [5.551]
C_4	1.981(.320) 5 [6.186]	2.998(.303) 6 [9.911]	1.703(.351) 4 [4.854]	2.601(.427) 3 [6.096]
C_5	2.034(.324) 4 [6.269]	3.049(.306) 3 [9.948]	1.702(.355) 5 [4.799]	2.533(.428) 5 [5.922]
C_6	2.125(.314) 3 [6.771]	3.038(.300) 5 [10.132]	1.744(.347) 3 [5.030]	2.591(.413) 4 [6.278]

TABLE V.1 -- Continued

Louisiana -- Group II

Estimated Parameter	1880	1890	1900	1910
C_1	1.434(.872) 3 [1.644]	2.500(.765) 2 [3.267]	3.430(.667) 4 [5.144]	3.068(.704) 6 [4.359]
C_2	1.551(.907) 2 [1.711]	2.670(.803) 1 [3.327]	3.605(.692) 2 [5.211]	3.296(.759) 3 [4.344]
C_3	1.682(.885) 1 [1.902]	2.475(.765) 5 [3.235]	3.859(.657) 1 [5.877]	3.399(.722) 1 [4.704]
C_4	1.176(.898) 6 [1.310]	2.478(.797) 4 [3.110]	3.302(.697) 6 [4.740]	2.799(.749) 7 [3.735]
C_5	1.118(.939) 7 [1.191]	2.345(.826) 7 [2.838]	3.499(.729) 3 [4.799]	3.354(.795) 2 [4.219]
C_6	1.263(.860) 4 [1.469]	2.495(.761) 3 [3.279]	3.319(.665) 5 [4.994]	3.245(.722) 4 [4.496]
C_7	1.230(.909) 5 [1.353]	2.379(.812) 6 [2.931]	3.283(.722) 7 [4.545]	3.210(.757) 5 [4.238]

TABLE V.1 -- Continued

Texas -- Group II

Estimated Parameter	1880	1910
C_1	-.196(.834) 6 [-.235]	.370(.626) 4 [.591]
C_2	.198(.853) 2 [.232]	1.019(.669) 1 [1.524]
C_3	-.184(.929) 5 [-.199]	.348(.695) 5 [.501]
C_4	-.314(.832) 8 [-.378]	.154(.629) 8 [.245]
C_5	-.336(.841) 9 [-.399]	.150(.638) 9 [.234]
C_6	-.184(.756) 4 [-.243]	.129(.631) 10 [.205]
C_7	-.0882(1.010) 3 [-.0874]	.448(.716) 3 [.625]
C_8	-.339(1.187) 10 [-.285]	.160(.800) 7 [.200]
C_9	-.373(1.109) 11 [-.336]	.849(.767) 2 [1.107]
C_{10}	.497(.575) 1 [.865]	.128(.590) 11 [.216]
C_{11}	-.272(.241) 7 [-1.127]	.165(.577) 6 [.286]

TABLE V.1 -- Continued

Notes to the Group II Regressions

1. All definitions of the tabled entries are the same as for the Group I results, except for the coefficients of B/R, H/T and (B/R)(H/T), which are different because of the change in specification.

2. The three tables following the main regression results are analogous to the corresponding tables of the previous chapter. The four-census averages of the estimated input elasticities were computed omitting from the average any values from a year in which one of the three input elasticities was outside the zero-to-one range. The max P-values just below the F statistics on the test of over-all significance of the C_i compared to a single constant are maximum values for the area under the appropriate F distribution to the right of the calculated F value. The approximate P-values of the χ^2 test statistics for the Friedman Two-Way Analysis of Variance by Ranks were calculated by interpolation.

The first thing to observe about these results is that the conclusions based on the Group I results regarding fit and reasonableness, exploitation of labor, returns to scale, and the over-all significance of the soil type coefficients are substantially unchanged. There are only four estimated land, labor and capital elasticities outside the zero-to-one range. The four-census averages of these elasticities are given in the following table, and none of these average values is greater than 1/2. Only Alabama's average labor elasticity is greater than .4. For the entire South, the over-all average labor elasticity is .319, compared with .309 for the Group I results. The averages of the estimates of β and γ are not very different, either. The production functions display constant returns to scale, with 19 of 35 estimated returns to scale parameters greater than one, 16 less than one. The t-statistic for testing the hypothesis that $\nu = 1$ is larger than 2 in absolute value in only 6 cases. Again, the soil type dummary variables' coefficients are usually significant as a group compared to a single constant term, and the four F values taken together are significant at the 5% level for every state but Texas. The values of the test statistic for the Friedman Two-Way Analysis of Variance by Ranks also show that the Hilgard categories still represent stable levels of residual fertility in this specification.

TABLE V.2

Four-Census Mean Values -- Group II Regressions

State	α	β	γ	ν
North Carolina	.358	.442	.208	1.008
South Carolina	.281	.439	.246	.966
Georgia	.397	.416	.234	1.047
Florida	.354	.167	.482	1.003
Tennessee	.294	.379	.315	.988
Alabama	.459	.501	.140	1.100
Mississippi	.230	.429	.332	.991
Arkansas	.319	.277	.402	.998
Louisiana	.305	.322	.353	.980
Texas	.195	.500	.438	1.133
Over-all unweighted average	.319	.387	.315	1.021

TABLE V.3

F-test on Over-all Significance of Coefficients of S_i as Compared to a Single Constant -- Group II Regressions

State	1880	1890	1900	1910
North Carolina F(m,n)	3.134(3,83)	2.474(3,85)	4.311(3,85)	4.366(3,81)
Max P-value	.05	.10	.01	.01
South Carolina	1.849(4,21)	3.218(4,23)	10.067(4,27)	22.395(4,28)
	.25	.05	.001	.001
Georgia	2.308(7,120)	1.246(7,118)	3.113(7,117)	18.353(7,127)
	.05	.50	.01	.001
Florida	4.201(3,29)	1.423(3,34)	2.654(3,31)	3.097(3,33)
	.025	.50	.10	.05
Tennessee	4.924(11,74)	5.505(11,74)	2.871(11,74)	8.543(11,73)
	.001	.001	.005	.001
Alabama	.924(8,50)	10.954(8,48)	1.788(8,48)	2.899(8,48)
	.51*	.001	.25	.025
Mississippi	.582(8,59)	6.297(8,60)	5.493(8,60)	9.100(8,62)
	.90	.001	.001	.001
Arkansas	6.440(5,61)	1.708(5,62)	1.270(5,62)	5.735(5,60)
	.001	.25	.50	.001
Louisiana	1.798(6,44)	1.491(6,45)	3.135(6,45)	2.280(6,44)
	.25	.25	.025	.10
Texas	1.057(10,205)			1.205(10,217)
	.50			.50

*by interpolation

Test statistic for Friedman Two-Way Analysis of Variance by Ranks, Group II Regressions:

State	χ^2_r(d.f.)	Approximate P-value (by interpolation)
North Carolina	$\chi^2(3) = 3.60$	.32
South Carolina	$\chi^2(4) = 9.00$	.06
Georgia	$\chi^2(7) = 15.58$	.03
Florida	$\chi^2(3) = 8.40$	.04
Tennessee	$\chi^2(11) = 39.77$	$<.01$
Alabama	$\chi^2(8) = 14.73$	.07
Mississippi	$\chi^2(8) = 17.87$	.02
Arkansas	$\chi^2(5) = 12.71$	.03
Louisiana	$\chi^2(6) = 12.64$	.05
Texas	$\chi^2(10) = 9.45$	.49

It is interesting to note that the max P-values calculated for the F-test on the over-all significance of the S_i coefficients are generally larger in the Group II regressions than in the Group I regressions. This is a reflection of the fact that the C_i represent residual fertility differences, after race and crop-specific differences have been accounted for. Since the modified specification of the production function contains an "interaction" term $(B/R)\cdot(H/T)$, the residual soil differences left to be measured by the coefficients of the S_i will be relatively less important than in the Group I specification. As before, the Hilgard variables seem to have little meaning in the case of Texas.

At first glance, the inclusion of the interaction term $(B/R)\cdot(H/T)$ does not seem to accomplish very much. Only two of the t-statistics associated with its coefficient are greater than two in absolute value after 1880, and there does not appear to be any particular pattern in the sign of its coefficient. However, while each of these estimated coefficients may not be significant alone, all of them taken together do follow a pattern. To see why this is true, it is necessary to explore in more detail the terms making up each coefficient. It will be shown that the important sign is not the sign of the coefficient of $(B/R)\cdot(H/T)$ itself, but the signs of various combinations of the coefficients of all three ratio terms.

For convenience in the subsequent discussion, write the coefficients of B/R, H/T, and $(B/R)\cdot(H/T)$ as

$$\frac{\alpha}{a_0k_0}(b_2l_2 - a_2k_2) + \frac{\beta}{c_0m_0}(d_2n_2 - d_1n_1) = x \tag{5-13}$$

$$\frac{\alpha}{a_0k_0}(a_1k_1 - a_2k_2) + \frac{\beta}{c_0m_0}(c_1m_1 - d_1n_1) = y \tag{5-14}$$

$$\frac{\alpha}{a_0k_0}(a_2k_2 - a_1k_1 + b_1l_1 - b_2l_2) + \frac{\beta}{c_0m_0}(c_2m_2 - c_1m_1 + d_1n_1 - d_2n_2) = z \tag{5-15}$$

Then

$$x + z = \frac{\alpha}{a_0k_0}(b_1l_1 - a_1k_1) + \frac{\beta}{c_0m_0}(c_2m_2 - c_1m_1) \tag{5-16}$$

$$y + z = \frac{\alpha}{a_0k_0}(b_1l_1 - b_2l_2) + \frac{\beta}{c_0m_0}(c_2m_2 - d_2n_2) \tag{5-17}$$

Substituting the predilection parameter identities derived from (5-8)

allows (5-13), (5-14), (5-16) and (5-17) to be rewritten as

$$x = \frac{\alpha}{a_0 k_0}(b_2 l_2 - a_2 k_2) + \frac{\beta}{c_0 m_0}(d_2 l_2 - d_1 k_2) \tag{5-18}$$

$$y = \frac{\alpha}{a_0 k_0}(a_1 k_1 - a_2 k_2) + \frac{\beta}{c_0 m_0}(c_1 k_1 - d_1 k_2) \tag{5-19}$$

$$x + z = \frac{\alpha}{a_0 k_0}(b_1 l_1 - a_1 k_1) + \frac{\beta}{c_0 m_0}(c_2 l_1 - c_1 k_1) \tag{5-20}$$

$$y + z = \frac{\alpha}{a_0 k_0}(b_1 l_1 - b_2 l_2) + \frac{\beta}{c_0 m_0}(c_2 l_1 - d_2 l_2) \tag{5-21}$$

As with the Group I results, the unknown Taylor series expansion point prevents any information's being recovered from these expressions but their signs and statistical significance as compared to zero. But the signs of (5-18)-(5-21) are more difficult to interpret than in the Group I case. Consider (5-18)-(5-21) one at a time.

It is possible for x to be greater than zero if $b_2 > a_2$, $d_2 > d_1$, $l_2 > k_2$, or some combination of the above inequalities. In words, $x > 0$ if black non-cotton growers are more productive than white non-cotton growers, if the non-cotton lands farmed by blacks are more productive than the non-cotton-lands farmed by whites, or if blacks have a greater predilection for non-cotton farming than whites. Thus, even this specification does not avoid the fundamental identification problem: there is no way to distinguish between the efficiency of farmers and the fertility of the land they work, from knowledge of total productivity alone. There is no way to determine from the sign of x whether a positive

value is due to the greater efficiency of black non-cotton farmers over white non-cotton farmers, or whether the blacks worked on more fertile lands. Either $b_2 > a_2$ or $d_2 > d_1$ (or both) leads to $x > 0$.

However, there are strong grounds a priori for believing that blacks had a predilection for cotton farming and not for the alternative types of farming. Recalling the definitions of the parameters,

$$\frac{l_2}{k_2} = \frac{\frac{B_2}{B} \cdot \frac{T}{J}}{\frac{W_2}{W} \cdot \frac{T}{J}} = \frac{\frac{B_2}{W_2}}{\frac{B}{W}} \qquad (5\text{-}22)$$

That is, $l_2 > k_2$ if the ratio of black non-cotton farmers to white non-cotton farmers was greater than the ratio of blacks to whites in the population as a whole, or alternatively if the proportion of blacks who farmed crops other than cotton was greater than the proportion of whites who farmed crops other than cotton. Strictly speaking, these farmers may have grown both cotton and alternative crops, in which case the interpretation of $l_2 > k_2$ would be that the proportion of black labor time devoted to non-cotton crops was greater than the corresponding proportion of white labor time. However, all indications point to blacks' being more heavily committed to cotton culture. The previous chapter showed that there was a positive correlation between the proportion of blacks in a county's population and the proportion of its improved acres in cotton in every state and every census year but South Carolina in 1890. Also, the testimony of contemporary observers indicated blacks' predilection for cotton. In the most extreme version of this view, blacks could grow nothing else:

> This farmer [whose testimony was just referred to], it should be noted, had no complaint to make about the efficiency of the labor employed, and others agree with him in considering the negro a satisfactory cotton laborer....[But as for]....diversified or intensive farming....the general opinion seems to be that the negro laborer is not suitable....
>
> [Some say] that the negro can raise cotton and nothing else; that he can not be trusted to care for stock; that he is unable to use farm machinery (as has been noted); that he will not give the care and attention necessary for diversified and intensive farming. It is said that any negro renter will not even cultivate his own garden patch to any great result in providing supplies for his family [2].

Of course, in light of the findings of Chapter II, such testimony can hardly be considered conclusive. Nevertheless, it does confirm the expectation <u>a priori</u>, supported by the concentration of blacks in the cotton counties, of a black predilection for cotton.

This is important for interpreting the results. Blacks' predilection for cotton ($k_2 > l_2$) would tend to make $x < 0$, thus working against those tendencies in productivity or fertility ($b_2 > a_2$ and $d_2 > d_1$) tending to make $x > 0$. If the estimates of the production functions show a preponderance of values of $x > 0$ (and it will be seen that they do), then the blacks' predilection for cotton <u>strengthens</u> the conclusion that black non-cotton farmers were more productive than white non-cotton farmers. Similarly, in three of four interpretations of the signs of expressions (5-18)-(5-21), blacks' predilection for cotton strengthens the conclusions based on the simple sign pattern of the estimates.

Similarly, $y > 0$ if $a_1 > a_2$, $c_1 > d_1$, $k_1 > k_2$, or some combination of these inequalities. Recalling the definition of the predilection parameters,

$$\frac{k_1}{k_2} = \frac{\frac{W_1}{W} \cdot \frac{T}{H}}{\frac{W_2}{W} \cdot \frac{T}{J}} = \frac{\frac{W_1}{W_2}}{\frac{H}{J}} \qquad (5\text{-}23)$$

so that $k_1 > k_2$ if the ratio of white labor time devoted to cotton over white labor time devoted to alternative crops was greater than the ratio of cotton land to non-cotton land over-all. That is, $y > 0$ if white cotton farmers were more efficient than white non-cotton farmers, if the cotton lands farmed by whites were more fertile than the non-cotton lands farmed by whites, or if whites had a predilection for cotton.

$x + z < 0$ if $a_1 > b_1$, $c_1 > c_2$, $k_1 > l_1$ or some combination of the inequalities. In words, $x + z < 0$ if white cotton farmers were more skillful than black cotton farmers, if the cotton lands farmed by whites were more fertile than the cotton lands farmed by blacks, or if whites had a predilection for cotton as compared to blacks.

Finally, $y + z > 0$ if $b_1 > b_2$, $c_2 > d_2$, $l_1 > l_2$, or some combination of the inequalities. That is, $y + z > 0$ if blacks were more productive in cotton than in alternative crops and livestock, cotton land worked by blacks was more fertile than other land worked by blacks, or if blacks had a predilection for cotton. It will be seen momentarily that this is the only case of blacks' predilection for cotton inclining the sign of one of the expressions in the direction actually observed.

Now consider the actual pattern of sign frequencies for the expressions (5-18)-(5-21). The table below summarizes these frequencies, as well as showing the probability of the given sign frequency or one more

TABLE V.4

Coefficient Sign Pattern -- Group II Regressions

State		1880	1890	1900	1910
North Carolina	x y	+ +	+ +	- +	- +
	x + z	-	-	+	-
	y + z	-	-	+	+
South Carolina		+ +	- +	- +	- +
		-	-	-	-
		-	+	+	+
Georgia		+ +	+ +	- +	- +
		-	-	-	+
		-	+	+	+
Florida		- +	- +	- +	+ +
		+	-	+	-
		+	-	+	-
Tennessee		+ +	+ +	- +	+ +
		-	+	-	-
		+	+	+	-
Alabama		+ +	- +	- +	- +
		-	-	-	-
		+	+	+	+
Mississippi		+ +	+ +	- +	- +
		-	+	-	+
		+	+	+	+
Arkansas		+ +	+ +	- +	- +
		-	+	-	-
		+	+	+	+
Louisiana		+ +	+ +	- -	- +
		-	+	+	+
		-	+	+	+
Texas		+ +			+ +
		-			-
		+			-

extreme under the null hypothesis that the distribution of signs is random, with plus and minus equally likely [3].

	+	-	
x	18	20	$\Pr(\text{Total - 's} \geq 20 \mid H_o) \approx \Pr(Z \geq .324) \approx .373$
	+	-	
y	37	1	$\Pr(\text{Total + 's} \geq 37 \mid H_o) \approx \Pr(Z \geq 5.840) \approx 0.000$
	+	-	
x+y	11	27	$\Pr(\text{Total - 's} \geq 27 \mid H_o) \approx \Pr(Z \geq 2.596) \approx .005$
	+	-	
y+z	29	9	$\Pr(\text{Total + 's} \geq 29 \mid H_o) \approx \Pr(Z \geq 3.244) \approx .0006$

Clearly the null hypothesis can be rejected in the last three cases, and cannot be rejected in the first case. (Note that if a two-tail test has been performed in the first case, the probability value would be doubled: .746. A two-tailed test would not make any difference in the other cases.) Write WC for white cotton farming, BC for black cotton farming, WN for white non-cotton farming, and BN for black non-cotton farming. Let the relation $\textcircled{>}$ stand for "is more productive than," $\textcircled{=}$ for "is roughly as productive as," and $\textcircled{\geq}$ for "is at least as productive as." Then for the South as a whole over the entire period, these sign frequencies lead to the conclusion that

$$\text{WC} \textcircled{>} \text{BE} \textcircled{>} \text{BN} \textcircled{=} \text{WN} \qquad (5\text{-}24)$$

Also, the predilection of blacks for cotton reinforces the strength of this relation in every case but that of BC $\textcircled{>}$ BN. Nevertheless, the preponderance of positive values of $y+z$ strongly suggests the indicated direction of the relation. It might be safest to say that BC $\textcircled{\geq}$ BN, however. It should be noted that in all cases of comparisons across race, the blacks' predilection for cotton tends to reverse the direction of the relation.

This is a striking relationship, with white farmers occupying both the top and the bottom of the agricultural productivity ladder. But before discussing it in more detail, it should be observed that basically the <u>same</u> relation between the productivities of the different groups of farmers holds when the sub-regions of the South are considered separately:

South Carolina + Georgia + Alabama + Mississippi
+ Arkansas + Louisiana ("Cotton Belt")

	+	-
x	10	14

	+	-
y	23	1

	+	-
x+z	7	17

	+	-
y+z	21	3

North Carolina + Florida + Tennessee + Texas (Periphery + Texas)

	+	-
x	8	6
y	14	0
x+z	4	10
y+z	8	6

The x coefficient displays a majority of positive signs in one case, a majority of negative signs in the other; but in both cases the majorities are slim. The other three expressions show the same sign majorities as for the South as a whole, even though the majority of positive signs of y + z is slim for the peripheral states. The probabilities of these sign frequencies or frequencies more extreme are not as small as for the South as a whole, which is to be expected for the smaller samples. Of greater importance than the exact binomial probabilities is the correspondence of the majorities to those for the entire region.

To summarize these results:

WC (>) BC (>) BN (=) WN	for the South as a whole, 1880-1910	(5-24)
WC (>) BC (>) BN (=) WN	for the Cotton Belt	(5-25)
WC (>) BC (=) BN (=) WN	for the Periphery	(5-26)

although the relations (5-25) and (5-26) are not as firmly established

as (5-24) because they are based on smaller samples of coefficients. It is also interesting that the same pattern of sign majorities holds in the case of y, x + z and y + z for the three sub-regions consisting of South Carolina + Georgia + Alabama + Mississippi, Arkansas + Louisiana + Texas, and North Carolina + Florida + Tennessee. For x one group has a majority of positive signs, one group a majority of negative signs, and one group an equal number of positive and negative signs. Again, the small sample sizes make exact probability calculations less valuable than for the South over-all.

South Carolina + Georgia + Alabama + Mississippi (Cotton states east of the Mississippi River)

	+	-
x	6	10
y	16	0
x+z	3	13
y+z	14	2

Arkansas + Louisiana + Texas (The "intermediate" states)

	+	-
x	6	4
y	9	1
x+z	4	6
y+z	8	2

North Carolina + Florida + Tennessee (The eastern "Periphery" states)

	+	-
x	6	6
y	12	0
x+z	4	8
y+z	7	5

Another interesting way of looking at these results is to examine the sign frequency pattern over time. Dividing the period into two sub-periods, 1880-1890 and 1900-1910, the sign frequency patterns are

1880-1890

	+	-
x	15	4
y	19	0
x+z	5	14
y+z	13	6

1900-1910

	+	-
x	3	16
y	18	1
x+z	6	13
y+z	16	3

These frequencies seem to indicate that the relative positions of white and black non-cotton farmers reversed themselves over the period -- while all the other relationships remained the same, and were the same as for the South as a whole. The relations could be written:

$$WC \,(>)\, BC \,(>)\, BN \,(=)\, WN \qquad 1880\text{-}1910, \text{ the entire period} \qquad (5\text{-}27)$$

$$WC \,(>)\, BC \,(>)\, BN \,(>)\, WN \qquad 1880\text{-}1890 \qquad (5\text{-}28)$$

$$WC \,(>)\, BC \,(>)\, BN \,(<)\, WN, \quad \text{and} \quad WC \,(>)\, WN \quad 1900\text{-}1910 \qquad (5\text{-}29)$$

The white non-cotton farmers' position improved in the latter sub-period. White cotton growers remained more productive than white non-cotton growers ($y > 0$) in both sub-periods, and therefore there is no way of assessing the relative productivities of white non-cotton and black cotton farmers in the 1900-1910 sub-period. Again, because of the small size of the samples for the sub-periods, the productivity rankings (5-28) and (5-29) cannot be considered as firmly established as the over-all aggregate productivity rankings for the South as a whole.

These are the main empirical findings of the production function estimations. However, in order to place these results in the context of the hypotheses under investigation, it is necessary first to suggest a plausible sequence of actual historical events which accounts for the observed productivity differences. This will be the task of the next chapter.

NOTES TO CHAPTER V

[1] This modification, key to the subsequent results, was originally suggested by Franklin Fisher.

[2] U.S. Industrial Commission, Reports of the Industrial Commission, Vol XV: Reports of the Industrial Commission on Immigration and on Education (Washington: Government Printing Office, 1901), 533. See also Chapter II above, 108-125 passim, particularly the testimony before the Industrial Commission (Note 192), "A Georgia Plantation"(Note 201), and Southern Cultivator (Note 209).

[3] The normal approximation to the binomial is used, and Z = a standard normal variable with mean 0 and variance 1. See Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics, Second edition (New York: The Macmillan Company, 1965), 199.

VI. INTERPRETATION OF THE RESULTS: THE LAND OCCUPANCY AND OWNERSHIP HYPOTHESIS

The results of the Group II estimates suggest a hypothesis which is consistent with all the statistical evidence presented so far, and which resolves the apparent paradoxes of the Group I results as well. This explanation rests on the following three conjectures:

(i) Before the Civil War, the large plantations occupied most of the best cotton land. The big slaveholders were able to capture this land because their ownership of slaves conferred on them a profit advantage derived from the exploitation of their slave labor. Some small white yeoman farmers and a certain number of whites with few slaves also owned fertile cotton lands, however. The worst lands were occupied almost entirely by non-slaveholding whites or whites owning only a relatively small number of slaves.

(ii) After the war and emancipation, the different population groups remained largely where they had lived before the war. That is, there may have been mobility of individual blacks from plantation to plantation, but the blacks as a whole continued to work for former slaveholders as sharecroppers or tenants. Similarly the pre-war "poor whites" continued to occupy the least fertile lands of each state.

(iii) In cases in which plantations were divided into smaller farms, whites tended to be located on the best of these lands. For example, if a plantation owner was forced himself to undertake farming in the period of post-war destitution, he would pick for his own use the best acres of the plantation. Similarly, non-inheriting sons, relatives, former

overseers, or other whites would have the choice of rental plots over freedmen. If plantations were driven onto the distressed sales market, whites would have a better opportunity to buy the best sections of the plantation, since the blacks emerged from slavery with no capital and no credit. The same division of cotton lands would be expected of small ex-slaveholders. A man who had owned one slave might hire the former slave as a tenant, but he would himself work the best acres of his small farm. In short, in the cotton farming regions, the whites would be likely to occupy the very best of the fertile cotton lands when the unsettled agricultural situation returned to equilibrium again after the war.

These three propositions imply a pattern of land occupancy that explains all the results of the Group II regressions. According to (i)-(iii), white cotton farmers were the most productive group because they occupied the best land. Blacks followed in productivity, since they had initially been located on the best lands, and as a group remained concentrated in the fertile cotton belt. The poor whites, whose land could not support cotton culture, had the lowest over-all productivity because of the poor quality of the land they occupied. The main determinant of any group's over-all productivity was the fertility of the land its members worked.

In addition to being consistent with the Group II results, this Land Occupancy and Ownership Hypothesis (hereafter referred to as the LOOH) accounts for the Group I findings and apparent paradoxes. Concentration of the blacks on the old plantation lands accounts for the

uniform correlation of the percentage of blacks in the total rural population and proportion of improved acres in cotton, as well as the location of the blacks on lands of greatest residual fertility, without requiring that the blacks occupied the very best of the available lands within counties. Similarly, the LOOH explains why whites would appear to be more productive than blacks in the cotton belt, and less productive than blacks on the periphery. There were relatively few cotton-farming whites in the peripheral states, compared to large numbers of whites growing other agricultural products, simply because of the scarcity of cotton land in those states. On the other hand, the blacks in those states were concentrated in the cotton counties, even if they did not occupy the prime cotton lands after the war. The relatively large number of low-productivity non-cotton-growing whites would tend to lower the over-all white productivity levels in those border states as compared to the over-all black productivity level, leading to the apparent finding that blacks were more productive than whites in those states. Conversely, in the cotton belt, more land was available for cotton, so that a relatively larger proportion of the white population was engaged in high-productivity cotton culture. Blacks were relegated to the second-best cotton lands, and possibly even to some plantation lands not suited for cotton. Thus, in the cotton belt, over-all white productivity appears greater than over-all black productivity in the Group I regressions.

The fact that the intra-regional difference in over-all productivities disappears in the Group II specification is strong evidence for the correctness of that specification. The Group II model captures all the race-

and crop-associated productivity differences found by the Group I model, while eliminating the paradoxes which seem to be generated by the Group I model. The LOOH is consistent with both sets of results.

The Group II regressions maintain the previous finding that a productivity advantage was associated with cotton. The LOOH would indicate that the source of this advantage was in the peculiar suitability of certain Southern lands for cotton culture, but does not require this. In any case, the Overproduction Hypothesis fares as badly under the specification of the Group II model as under the specification of the Group I model.

In addition, these results create insurmountable problems for any simple Legacy of Slavery Hypothesis. If differences in "human capital" were the source of productivity differentials, and if the blacks as a group emerged to freedom deficient in education, entrepreneurship and farming trade skills, how can the position of white non-cotton farmers on the bottom of the productivity ladder be explained? The estimates show that white cotton farmers were most productive, white grain farmers least productive; as well as substantial productivity differences between black cotton farmers and black grain farmers. Blacks as a group were simply not less productive than whites as a group.

Similarly, how could the "legacy of slavery" explain the Group I regional differences? Sutch and Ransom have summarized the Census reports on the different levels of illiteracy among blacks and whites in the years following the Civil War [1]. Part of one of their tables shows these differences had no pronounced regional component, though

literacy levels did vary with race and over time. Except for 1880, the whites as well as blacks were, if anything, more literate in the Periphery, though the statistical significance of the difference in regional literacy levels is impossible to ascertain. In any case, if literacy was any measure of productivity-raising human capital, whites should have been more productive than blacks everywhere, not only in the cotton belt.

	Percentage of population ten years of age and over recorded as unable to write				
Blacks	1870	1880	1890	1900	1910
South Carolina, Georgia, Alabama, Mississippi, Louisiana	87.2	79.0	66.5	54.1	39.3
Eleven states of Old Confederacy (the 10 states plus Virginia)	86.3	77.1	61.8	49.3	34.5
Native Whites					
South Carolina, Georgia, Alabama, Mississippi, Louisiana	--	21.9	17.0	13.1	9.2
Eleven states of Old Confederacy	--	22.7	15.9	11.8	8.2

An argument could be made that the freedmen had actually learned more about farming during their servitude than was known by the ignorant poor whites of the back woods. The top productivity of the white cotton farmers would be attributed, in this view, to the knowledgeability of this group, drawn as it was from former planters, overseers, yeoman cotton farmers and small slaveholders. Due to the now-familiar

identification problem, there is no way to reject this possibility on the basis of the productivity evidence. However, such localization of productivity differences would be so different from the simple "legacy of slavery" idea that it would require a totally different description and rationale.

Another advantage of the LOOH is that it corresponds to the competitive model of income distribution based on factor ownership. The absence of exploitation in the factor markets, combined with the estimates of the input elasticities of the agricultural production functions (with the competitive output shares they imply) makes it clear that the degree of capital and land ownership was a crucial determinant of a farmer's income. The actual or imputed wage rate, which depended on the marginal product of labor, was important in determining the farmer's income; but farm ownership was equally important, since the competitive land share was comparable to the competitive labor share of output. Thus a white corn farmer might be less productive than a black cotton farmer because he worked poorer land, yet still receive a higher income due to his ownership of that poor land. Even relatively infertile land was a valuable asset.

Wages may have been equalized between the different counties of each state, but this is not required for the LOOH or for any of the results established so far. (Production function aggregation requires that the wages, rents and capital costs be the same from farm to farm <u>within</u> counties--see Appendix 2--but not that these factor prices be the same across counties.) The results indicate that the factors were paid

according to the value of their marginal products, but this does not imply equalization of factor prices everywhere. It only means that the extent of the area over which competition equalized factor prices was at least as large as the county. If total productivity differences were due to soil fertility differences, as is the case under the LOOH, these differences would be reflected as differential rents accruing to the landowners, or possibly as higher wages earned by the fortunate residents of the more fertile cotton-growing counties, if there was not enough trade or factor mobility to equalize wage rates between counties. Indeed, if factor prices were completely equalized across counties, then with perfect competition there would have been no variation in effective factor ratios, and no estimates could have been obtained at all.

Since the blacks were emancipated without capital or land, even poor whites who owned their own land after the war probably had better opportunity to obtain good land as time went on than did landless blacks. This would help account for the ultimate location of the whites on the best lands (as postulated by the LOOH). Furthermore, natural abilities being distributed equally in the white and black populations, the "head start" enjoyed by the whites in factor ownership could account for the reversal in non-cotton farmers' productivities between the beginning and the end of the period. Since the whites started the post-bellum period with more resources, they could have begun to displace blacks on the better lands over the years. This is only conjecture, however. If black-white productivity differences were due to the legacy of slavery, it seems that these differences would have been greater the nearer in time to

emancipation, so that if any productivity reversal were to take place, the blacks would be in their worst position soon after the Civil War. An explanation of the productivity reversal based on human capital could be constructed, but it would have to be far more complicated than any simple slavery-induced disability.

A further advantage of the LOOH is that it is possible to find support for it in the narrative evidence from the period. As should be amply clear from the second chapter, such evidence is neither necessary nor sufficient for the LOOH or any other hypothesis. Nevertheless it is encouraging to find scattered examples of exactly the kind of land occupancy and ownership patterns required for the LOOH.

To begin with, there appears to be a consensus among both historians and contemporary observers that the slave plantations were located on the best lands prior to the Civil War. Roger Shugg, who collected information on the fertility of Louisiana lands in documenting the history of economic conflicts in Louisiana, found that

> In few parts of the world has there been deposited so much alluvial soil as in Louisiana....The black and brown clay is so prodigally fertile that it yields more cotton and sugar than other Southern soil.*...Such rich land could be profitably exploited only by rich planters. It early brought prices beyond the reach of newcomers without plenty of capital. Indeed, none but the wealthy could afford to cultivate, much less to buy, these river bottoms** [2].

Shugg also saw the link between the advantages of slaveholding and control of these premium lands.

> Nonslaveholders were depressed and excluded from the plantation system not only because they failed to secure good land, but also because they gradually lost the ability to buy Negroes...
> . . . . . .

> Since nonslaveholding farmers were unable to operate on a large scale and with cheap labor, they could not specialize in profitable staples such as cotton and sugar, nor cultivate land especially valuable for their production.
>
> A host of farmers were therefore expelled from fertile regions by the expanding plantation system.* The best soil was needed for commercial agriculture, and planters were able to command it at a premium because of the profit derived from slavery.** Yeomen and nonslaveholders had no choice but to move westward or retreat to sandy patches in the woods and narrow margins along the swamps and bayous*** [3].

Nevertheless, Shugg reports that even in the leading cotton and sugar parishes before the war, 1/3 to 1/2 of the farmers owned fewer than six slaves, indicating that relatively small farms existed alongside the large plantations before the war [4]. Shugg's findings are corroborated by another historian of Louisiana:

> The great bulk of Louisiana's poor, white rural population lived outside of the wealth-laden valleys. The small farmers' land was usually in sections of the state where the soil was thin and sandy or where it was difficult to use the steamboats which carried agricultural produce to New Orleans and returned with imported supplies. It is true that there were some small farms in the alluvial valleys, but their aggregate value and production was negligible when compared with that of the neighboring plantations [5].

There is no reason to believe that Louisiana was atypical in this regard.

Enoch Banks, the economist, found roughly the same situation in Georgia prior to the war.

> ...The region in which farms worked by their proprietors tended to prevail more than elsewhere was outside the region characterized by large possessions of lands and slaves. Moreover, such farms prevailed in the rugged region of the north and the pine flats of the south, each of which was relatively uninviting from the economic point of view....It was, therefore, in the cotton and rice sections that the slavery plantation system predominated. Even here, however, it must be remembered, the small farm existed side by side with the large plantation [6].

Banks also stated that some of the less aggressive whites who were reluctant to become pioneers became "in a few cases, tenants on the poorer parts of the large plantations" [7]. This assessment of the pre-war patterns of landownership was shared by so unlikely a source as the Presbyterian Banner of Pittsburgh, which saw in the gradual take-over of the best Southern lands by slaveholders the origin of the late 19th century poverty and ignorance of the Southern mountain whites:

> In 1792 Whitney invented the cotton gin. Cotton lands became more valuable; slaves did the work. The non-slaveholders could not find employment, either as artisans or as field hands. Those that were embarrassed and trying to hold their lands had to sell out; and thus an increased number had to betake themselves to the mountains....There were no schools in the mountains. There were few church privileges....Each succeeding generation was more illiterate than the preceding one. Idleness, hunting and poor soil, with their isolation, absence of schools, and churches without an educated ministry, have produced that condition of thriftlessness and poverty in which they are now found....
> "....The present condition of these people is directly traceable to slavery; for, in making the slave the planter's blacksmith, carpenter, wheelwright, and man-of-all-work, slavery shut every avenue of honest employment against the working white man and drove him to the mountains or the barren sandhills" [8].

It should be noted that this passage contains a mixture of "human capital" and "land occupancy" explanations of the low productivity of the mountain whites.

Ulrich Phillips observed that as late as the 1920's:

> Everywhere east of Texas the best cotton districts are peopled by a majority of Negroes today, because within the space of threescore years and seven from the invention of the gin, planters had carried slaves in predominant numbers to all these districts and had maintained market inducements causing slave traders to supplement the effects of their own migration. In the same period they placed the American cotton belt in an unchallenged primacy in the world's production of the staple [9].

In the same article, Phillips remarked: "...no one who could pay any price for farm land would dally with the pine barrens [poor soil] before the introduction of commercial fertilizers. Certainly the planters avoided them with one accord. At the other extreme, the alluvial tracts were occupied by planters from the beginning, with little participation by farmers--partly because the problem of flood control put a premium upon large-scale undertakings" [10].

In fact, given the obvious fact that a large slaveowning planter was in general richer than a non-slaveholding yeoman farmer in the pre-war days, it would actually have required perverse operation of the land market for the best lands to fail to be concentrated in planters' hands. The scattered quotations given above indicate that various historians and observers recognized the organization of the most fertile lands into plantations. Nowhere was any indication given that the poor whites owned the better lands before the war.

More pertinent to the LOOH are accounts of what happened to the pattern of land occupany and ownership after the Civil War. The evidence for the LOOH is of three types:

(1) Evidence that after the war many "poor whites" remained on lands relatively poor as compared to the old plantation cotton lands.

(2) Evidence that blacks as a group remained largely where they had been located before the war, on the lands of the old plantations.

(3) Evidence that some old plantation lands, particularly the best lands, came under the control of whites.

Both direct and indirect evidence for all three of these propositions can be found.

A.B. Hart portrayed the condition of the various groups after the war in exactly the same terms as could have been applied prior to 1860. In fact, Hart implicitly subscribed to the theory that non-slaveholding whites suffered a competitive disadvantage against slaveholders, and thus were driven to the hills in the pre-war years. That is where they stayed, so after the war the "mountaineers" of the South occupied "the most sterile of 'upright' and stony farms, farms the very sight of which would make an Indiana farmer sick with nervous prostration" [11]. Hart went on to say:

> The Mountain Whites ought not to be confused with the Poor Whites of the lowlands. Although there are many similarities of origin and life, the main difference is that the mountaineers have almost no Negroes among them and are therefore nearly free from the difficulties of the race problem. In the lowlands as in the mountains, men whose fathers had settled on rich lands, as the country developed were unable to compete with their more alert and successful neighbors, who were always ready to outbid them for land or slaves; therefore they sold out and moved back into the poor lands in the lowlands, or into the belt of thin soil lying between the Piedmont and the low country. Hence the contemptuous names applied to them by the planting class--"Tar Heels" in North Carolina; "Sand Hillers" in South Carolina; "Crackers" in Georgia; "Clay Eaters"in Alabama; "Red Necks" in Arkansas; "Hill Billies" in Mississippi; and "Mean Whites," "White Trash," and "No Count" everywhere [12].

Hart also pointed out that many of the post-war plantations employed "managers," whose role was analogous to the pre-war overseer, and that some of these managers had "some opportunity to plant on their own account..." [13].

A similar view of the Southern poor whites was expressed, without as much sympathy, by Timothy T. Fortune, the black radical journalist:

> As the poor whites of the South were fifty years ago, so they are to-day--a careless, ignorant, lazy, but withal, arrogant set, who add nothing to the productive wealth of the community

> because they are too lazy to work, and who take nothing from that wealth because they are too poor to purchase. They have graded human wants to a point below which man could not go without starving. They live upon the poorest land in the South, the "piney woods," and raise a few potatoes and corn, and a few pigs, which never grow to be hogs, so sterile is the land upon which they are turned to "root, or die." These characteristic pigs are derisively called "shotes" by those who have seen their lean, lank and hungry development. They are awful counterparts of their pauper owners. It may be taken as an index of the quality of the soil and the condition of the people, to observe the condition of their live stock. Strange as it may appear, the faithful dog is the only animal which appears to thrive on "piney woods" land [14].

These assessments are typical of the widely-held view that the poor whites of the Southern backlands continued to occupy the relatively infertile lands after the war, just as they had before the war [15].

Many writers commented on the ultimate return of the blacks to the plantations after they had "tested their freedom" upon emancipation. In some cases the blacks returned to the very plantations where they had worked as slaves; in other cases they seem to have changed places with other blacks.

Carl Schurz noted in his Report that despite the widespread black migrations and congregations of freedmen at the Union army camps, "Still others, and their number was by no means inconsiderable, remained with their former masters and continued their work on the field..." [16]. Fleming's Documentary History of Reconstruction contains several examples of this same phenomenon. Mrs. Frances Butler, a Georgia plantation manager whose letters have survived, wrote: "The negroes seem perfectly happy at getting back to the old place and having us there, and I have been deeply touched by many instances of devotion on their part..." [17].

The same story was told by Mrs. V.V. Clayton, in another plantation reminiscence [18]. A Northern missionary to the South also found that after the war "the one-time masters undertook to run the plantations by hiring the former slaves" [19].

In The Plantation Negro as Freeman, Philip Bruce argued that even in the face of the massive black migrations following emancipation, freedmen soon were again providing labor on the plantations.

> Many of the largest plantations were almost depopulated of their former laborers, the places they vacated being filled by those who had immigrated from other sections or had come in from the same countryside [20].

The perceptive English traveler, Robert Somers, disagreed as to the freedmen's preferences in employers, but concurred in the belief that they remained on the plantations:

> The old proprietors have an advantage in this respect [securing their labor supply] over new planters. The negroes seem to prefer their employment, and, after various changes, come back and settle down to work in their old places...[21].

At least one modern historian saw in the desire of the freedmen to remain in the "sections with which they were familiar" an impetus towards establishment of the sharecropping system [22].

Testimony before the government committees confirmed both the ownership of the best lands by planters and the continued location of blacks on those lands. In Mississippi

> The owners of the large plantations do not wish to cut up their plantations at all, and all the good land in Mississippi is generally owned by the large planters. The small planters generally have poor land, hilly land, while the large plantations are generally bottom lands. In other words, there is in the central portion of the State considerable rich land called "hummock lands," which is generally held in large plantations.

> The valley of the Tombigbee contains a very large negro population, and the planters have always hoped to work their plantations with the negroes since the surrender....I myself told the negroes at the time of the surrender that it would be much better for them to go back on the plantations to work, and that they would be secured under their contracts as long as I was there and the troops were there; and a large portion of the negroes did so. This was some time before the Freedmen's Bureau took charge of them [23].

A witness before the Industrial Commission indicated both that when blacks moved they went from one plantation to another, and that many did not even go that far:

> ...In a general way our labor throughout that section of Georgia is very content and permanent in its home life. They move about from plantation to plantation every 2 or 3 years--some of them; but to-day I have men on my place who were slaves on the place, living there during the reconstruction troubles, who were very much alarmed because a stranger came in and bought a farm. They thought they would have to move off, and they could not keep their old ways;....They have always lived there and will probably die there, right on the plantation where they were born [24].

Again, the point that blacks remained on lands which had formerly been plantations is hardly to be denied. Emancipated without resources, the blacks had to survive. The only sources of subsistence were working for a planter, rations issued by the Freedmen's Bureau, or employment outside the agricultural sector. Under these circumstances it could only be expected that after the Freedmen's Bureau had been disbanded, most blacks who remained in agriculture would find employment on the productive lands of the old plantations.

The most questionable of the assumptions of the LOOH is the assumption that cotton-growing whites had access to the most fertile available lands. Nevertheless there are indications scattered through the narrative accounts suggesting that just such a pattern of land occupany emerged after the Civil War.

The 1880 Census' discussion of the reliability of its statistics on cotton production included an offhand reference to the cultivation of the best plantation lands by the landowners themselves:

> Cotton, more over, is now very largely raised "on shares," or by special arrangements of a great variety of forms, which tend to endanger the accuracy of a popular enumeration. Thus, to take a comparatively simple case, a large planter not infrequently cultivates a part of his estate under his own management, while letting other, perhaps the more distant or less valuable, parts to be cultivated on shares by others. Herein, it will be seen, is involved the danger either of duplication or of omission. The planter, in answering the questions of the enumerator, may either report only that cotton which he raises on his own account strictly, or he may include his part of the cotton raised for him on shares, or he may include all that is raised on his estate [25].

More explicit support for the LOOH would be difficult to imagine. Other observers attested to similar division of the former plantation lands between the different groups of farmers. For example, Robert Somers identified several new sources of white labor on the old plantation lands after the war--white "croppers," sons of the planters themselves, and ambitious poor whites of the hill districts who came down from the mountains to buy or rent lands of the ravaged plantations.

> I have seen more than one great plantation absolutely deserted, and as void of fence or labour as it was at the end of the war. [Somers is writing in 1870-71.] This state of affairs has given rise to assiduous efforts to rent out land to cultivators; and a class of people called "croppers," mostly whites, enter into annual tenancies of land [26].

Somers believed that this type of labor was not generally successful, unlike operation of some plantations by the sons of planters:

> Yet behind all this difficulty there is an undergrowth of wholesome influences at work that promise ultimately a great revival and deliverance. The sceptre falling from the hands of fathers is being grasped by vigorous and stalwart sons, who are rallying labour round them, and, while plodding in the cotton field, are also riding and hunting, courting and marrying, and casting all the past behind them with hopeful outlook to the future [27].

Finally, the distress of the planters provided a source of hope and an incentive to the poor whites of the hills. After a successful year due to high cotton prices

> These small hill farmers come down occasionally into the plain, looking for land to rent or buy; and it is not improbable that many of the better and more industrious class of families in "the mountains," as the gently swelling uplands are called, will eventually come down altogether, and help to renovate the waste places, and build up the agricultural prosperity of the Valley [28].

Somers also attributed the increase in the cotton crop in the years following the Civil War to the rise of white cotton farmers. These whites were small farmers who had not grown cotton before the war, white laborers who availed themselves of the opportunity to rent and sharecrop, white villagers who joined in the cotton harvest or grew small garden plots of the staple, and

> The cloud of white planters and their families, reduced to poverty, who have been the foremost to go down into the Western bottoms, and there and elsewhere have bent with noble fortitude and ardour to labour in the fields [29].

Other commentators saw the same trends. Henry W. Grady made the point that many whites and even some blacks were able to buy former plantation lands at distressed post-war prices:

> Let into the market by the low prices to which the best lands had fallen, came a host of small buyers, to accommodate whom the plantations were subdivided, and offered in lots to suit purchasers. Never perhaps was there a rural movement, accomplished without revolution or exodus, that equalled in extent and swiftness the partition of the plantations of the ex-slaveholders into small farms. As remarkable as was the eagerness of the negroes...the earth-hunger of the poorer class of the whites, who had been unable under the slave-holding oligarchy to own land, was even more striking [30].

Another writer found former overseers following the same route to landownership [31]. Matthew Brown Hammond told the same story:

> The purchasers of these [distressed] lands came in part from the North, being chiefly men whom political or military affairs had brought to the South and who were induced by the high prices of cotton and the low prices of the land to attempt the cultivation of this staple. In the main, however, the purchasers were found within the South itself. The poor whites whose inability to own slaves had kept them largely out of cotton growing before the war, were now eager to undertake the cultivation of this staple on the better lands offered for sale on such favorable terms. A great increase in the number of small farms took place during the years following the war [32].

The 20th century historian of Populism, Hicks, also asserted that the former overseers and small farmers who had owned land adjacent to the plantations before the war acquired plantation lands at the depressed post-war land prices [33].

Vernon Wharton found in Mississippi a movement of both white tenants and buyers onto vacant plantations. In some instances, these whites located on lands deserted by migrating Negroes [34]. Shugg found manuscript records referring to rich river-bottom lands that allegedly could be occupied without paying a cent and without risking anything but a lawsuit [35], but he said that many piney-woods natives shunned the diseases, different methods of cultivation, and Negroes of the lowlands. Such fastidiousness is not entirely plausible.

Shugg also alludes to a reversion to actual farming by some of the planters ruined by the war:

> [Some of the planters] regained a fair measure of comfort by the proverbial sweat of their brows.* With "their sons and grandsons following the plow and wielding the hoe," it soon came to be noticed that "in many of the descendants of the old planters a yeomanry is springing up as honorable as our planting aristocracy of yore"[36].**

One such planter adopted owner-operation of his farm for reasons other

than wartime devastation, and wrote to the Southern Cultivator:

> The war left me an old but valuable plantation, a large stock of horses, mules, mares and colts; also cattle, sheep and hogs, and about forty freed negroes--fat, sleek and well cared for, but who unfortunately took it into their woolly pates that I had committed an unpardonable sin in ever having held them in slavery, and consequently considered it their religious duty to take everything they could lay their hands on from me, as properly belonging to them. By stealing, slander, &c., I was reduced in five years to running a two-horse farm, with very limited means to do it with. During all these years, I had tried hiring in all the usual ways, of wages and part of the crop....So at the commencement of last year, I saw that, unless a change took place, I would be a ruined man. I determined, therefore, to hire no hands that year, but to do the best I could by my own labor and that of my son, a youth 19 years of age [37].

This planter found himself "too little accustomed to manual labor" and settled on hiring black workers by the day, but there were undoubtedly others who tried the same thing. The Cultivator later reprinted an article by J.C. DeLavigne from DeBow's Review, which claimed that there were enough abandoned plantation lands waiting for labor to be applied to make everyone rich [38].

In testimony before the Industrial Commission during the '90's, the Georgia State Commissioner of Agriculture remarked that "The most of the landowners down there live on the farms themselves and cultivate what they can, then they turn out or rent out the balance of the land under these systems" [39]. Under normal circumstances, it might be expected that these landlord/cultivators would locate themselves on the choicest plots in their holdings.

Even the Hampton Institute's Southern Workman provides support for the LOOH. Orra Langhorne wrote a series of "background" articles on various aspects of Southern life for the Workman. One of her articles,

"A Poor White Man's Experience Since the War," consisted of a short biography of one James Johnson, a former overseer. Johnson lived in Virginia, and had bought a few slaves and some poor land before the war broke out. He lost the slaves and was drafted into the Confederate army, but deserted before Lee's surrender. Returning home, he and his wife survived by planting a garden, some corn and tobacco. Johnson was not absolutely penniless--he was able to trade some old harnesses and a saddle for a plow without a point; then he bought a plow point with what money he had. Then,

> ...Two or three years after the close of the war, Johnson found himself going back to his old dreams of owning land, and it was not long before he purchased an excellent creek bottom farm, to which he has from time to time made additions, until he now owns seven hundred acres of land...[40].

James Johnson's progress from overseer and owner of poor land to prosperous white farmer owning rich land must have been repeated throughout the South.

All the historical references in support of the LOOH to this point have dealt with the pattern of land <u>occupancy</u> by the various groups. It is also clear that many diverse individuals were conscious of the importance of land <u>ownership</u> in the determination of farmers' incomes. The best examples of this consciousness came out during the debate over land reform that followed the collapse of the Confederate armies. Proposals for confiscation and redistribution of the lands of the defeated rebels were made by Thaddeus Stevens and others at the close of the war. These proponents of confiscation anticipated the LOOH, at least insofar as its emphasis on factor ownership in income distribution is concerned.

While the supporters of land reform in the South were able to generate little support in the North, articulate Radical Republications were not the only advocates of confiscation and redistribution of rebels' lands. Large numbers of freedmen themselves ardently hoped for "40 acres and a mule" to accompany their emancipation [41]. Frederick Douglass perhaps expressed best the feelings of frustration and bitterness which must have overtaken the blacks as the realization dawned on them that their dreams of land and capital ownership were to be denied:

> History does not furnish an example of emancipation under conditions less friendly to the emancipated class than this American example. Liberty came to the freedmen of the United States not in mercy, but in wrath--not by moral choice but by military necessity--not by the generous action of the people among whom they were to live, and whose good will was essential to the success of the measure, but by strangers, foreigners, invaders, trespassers, aliens, and enemies. The very manner of their emancipation invited to the heads of the freedmen the bitterest hostility of race and class. They were hated because they had been slaves, hated because they were now free, and hated because of those who had freed them. Nothing was to have been expected other than what has happened, and he is a poor student of the human heart who does not see that the old master class would naturally employ every power and means in their reach to make the great measure of emancipation unsuccessful and utterly odious. It was born in the tempest and whirlwind of war, and has lived in a story of violence and blood. When the Hebrews were emancipated, they were told to take spoil from the Egyptians. When the serfs of Russia were emancipated, they were given three acres of ground upon which they could live and make a living. But not so when our slaves were emancipated. They were sent away empty-handed, without money, without friends, and without a foot of land upon which to stand. Old and young, sick and well, were turned loose to the open sky, naked to their enemies. The old slave quarter that had before sheltered them and the fields that had yielded them corn were now denied them. The old master class, in its wrath, said, "Clear out! The Yankees have freed you, now let them feed and shelter you" [42]!

The advocates of the land reform proposals often made the connection between political democracy and landownership in classical Jeffersonian

terms. Implicit in their arguments is the idea that in a competitive market economy, ownership of the land is a crucial determinant of income and economic independence. An ex-Confederate army officer would seem to be an unlikely proponent of confiscation. Nevertheless, Sidney Andrews, correspondent to the Boston Advertiser and the Chicago Tribune, reported to the Joint Committee on Reconstruction a conversation he held during a railroad journey with an ex-rebel army captain, a man who had been a lawyer before the war. Andrews did not reveal the identity of his train companion. He did record the conversation immediately after it had been concluded, however, and this is what the anonymous Confederate officer had to say:

> No, I have not much faith in the idea that capital and labor will reconcile themselves. Things are exceptional here. Our capital is all in the hands of a few, and invested in great plantations. Our labor is all in the hands of a race supremely ignorant, and against whom we all have a strong prejudice. In my opinion, you can't reconcile these two interests unless you put the labor in subjection to the capital--that is, unless you give the white man control of the negro. Of course, that can't again be allowed, and therefore there's an almost impassable gulf between the negro and freedom unless the government aids him.
>
> I'll tell you what I think you [the victorious North] should have done. The policy of confiscation should be rigidly carried out at once. Mercy to the individual is death to the State; and in pardoning all the leading men, the President is killing the free State he might have built here. The landed aristocracy have always been the curse of the State. I say that as a man born and reared in Georgia and bound to her by every possible tie. Till that is broken down there can be no real freedom here for either the negro or the poor white. The result of the war gave you a chance you will never get again to overthrow that monopoly. The negroes and the poor whites are bitter enemies in many respects, but they agree in wanting land. You should have carried out your confiscation policy--divided up the great plantations into fifty-acre lots, and sold them to the highest bidders. That would have thrown some of the land into other large plantations, but it would have been fair, and would have given the poor whites and the negroes a chance. Give a man a piece of land, let him have a cabin of his

> own upon his own lot, and then you make him free. Civil rights are good for nothing, the ballot is good for nothing, till you make some men of every class landholders. You must give the negroes and the poor whites a chance to live--that's the first thing you should do. The negro has a great notion to get a piece of land, and you should help him along by that notion...[43].

The former rebel told Andrews that "I should be shot before to-morrow morning if I were to publicly say what I've said to you," [44] so there is little wonder that Andrews would not reveal the identity of his source.

The most eloquent advocate of confiscation was Thaddeus Stevens. He argued forcefully that such an opportunity to build a more egalitarian society in the conquered South would never come again:

> But, it is said, by those who have more sympathy with rebel wives and children than for the widows and orphans of loyal men, that this stripping of the rebels of their estates and driving them to exile or to honest labor would be harsh and severe upon innocent women and children. It may be so; but that is the result of the necessary laws of war. But it is revolutionary, say they. This plan would, no doubt, work a radical reorganization in southern institutions, habits and manners. It is intended to revolutionize their principles and feelings. This may startle feeble minds and shake weak nerves. So do all great improvements in the political and moral world. It requires a heavy impetus to drive forward a sluggish people. When it was first proposed to free the slaves, and arm the blacks, did not half the nation tremble? The prim conservatives, the snobs, and the male waiting-maids in Congress were in hysterics.
>
> The whole fabric of southern society must be changed, and never can it be done if this opportunity is lost. Without this, this Government can never be, as it never has been a true republic. Heretofore, it had more the features of aristocracy than of democracy--The Southern States have been despotisms, not governments of the people. It is impossible that any practical equality of rights can exist where a few thousand men monopolize the whole landed property. The larger the number of small proprietors the more safe and stable the government. As the landed interest must govern, the more it is subdivided and held by independent owners, the better. . . .How can republican institutions, free schools, free churches, free social intercourse exist in a mingled community of nabobs and serfs; of the owners of twenty thousand acre manors

> with lordly palaces, and the occupants of narrow huts inhabited by "low white trash?"--If the south is ever to be made a safe republic let her lands be cultivated by the toil of the owners or the free labor of intelligent citizens. This must be done even though it drive her nobility into exile. If they go, all the better [45].

To summarize, then, the Land Occupany and Ownership Hypothesis is consistent with the econometric findings of the previous chapter, and has a basis in the narrative accounts of contemporary observers and careful historians as well. Because of an identification problem, it is fundamentally impossible to attribute productivity differences solely to differences in land quality or to differences in skill levels of the different groups of agricultural workers. Nevertheless, the results conclusively eliminate the naive "legacy of slavery" notion that blacks as a whole were less productive than whites as a whole because they were deprived of human capital. The observed differences in productivity (with white cotton farmers most productive, followed by black cotton farmers, black non-cotton farmers, and white non-cotton farmers at the bottom of the scale either less or no more productive than the black non-cotton farmers) may, of course, have been due to some combination of locational fertility factors and human capital disparities, but again, there can be no simple categorization of blacks as less productive than whites due to the "legacy of slavery."

Similarly, whichever specification is used, a strong productivity advantage is associated with cotton. The strength and uniformity of this advantage is sufficient grounds to reject the hypothesis that cotton was a relatively unprofitable staple. Rather it would appear that cotton

enjoyed such a comparative advantage that anyone who had land suitable for cotton culture could have generated more output in value terms by concentrating on cotton than in alternative lines of agricultural production. Nevertheless there must have been marginal lands, which were about equally able to sustain cotton or the alternative crops. Crop rotation alternating cotton and corn was surely practiced, and the two crops were even occasionally grown side by side on the same piece of land [46].

The LOOH is consistent with all these findings, as well as with the major result of marginal product factor pricing in contradiction of the Exploitation Hypothesis. In fact one of the greatest attractions of the LOOH is that it requires no market imperfections, no institutional peculiarities, no deviations from an ordinary competitive private enterprise economy to explain all the econometric results. The very simplicity and "naturalness" of the LOOH, flowing as it does out of normal competitive behavior given the factor endowments of the various segments of the population at the close of the war, recommends it as the "null hypothesis" for future investigations of Southern agricultural productivity and income distribution.

It was pointed out in the first chapter that "overproduction" might mean a lack of price-responsiveness on the part of farmers who needed to change their planting mix in the face of changing relative prices. It is to this issue that attention will now be directed.

NOTES TO CHAPTER VI

[1] Richard Sutch and Roger Ransom, "Debt Peonage in the Cotton South After the Civil War," Table 3 (page 8 in the mimeograph draft version). Sutch and Ransom's sources are:
1870: United States Census Office, Ninth Census, The Statistics of the United States... (Washington: Government Printing Office, 1872), 396-7, and United States Census Office, Ninth Census, The Vital Statistics of the United States... (Washington: Government Printing Office, 1872), 560 and 662-3.
1880, 1890, and 1900: United States Census Office, Twelfth Census, Census Reports, Volume II, "Population, Part II" (Washington: Government Printing Office, 1902), c-cv.
In the Sutch and Ransom table, "blacks" includes Chinese, Japanese and Indians, as well as persons of Negro descent.

[2] Roger W. Shugg, Origins of Class Struggle in Louisiana: A Social History of White Farmers and Laborers During Slavery and After, 1840-1875 ([Baton Rouge]: Louisiana State University Press, 1939 and 1968), 4-5. Shugg's footnotes in this passage are:
*U.S. Census, 1860, Preliminary Report, 200-1. Shugg asserts in the footnote that "After 1870 the black, waxy prairie of Texas rivaled Mississippi alluvium; since 1900 the boll weevil has hurt both regions."
**U.B. Phillips, "Plantations with Slave Labor and Free," A.H.R., XXX (July 1925), 746.

[3] Shugg, Origins of Class Struggle..., 86, 94-5. Shugg's sources for the latter passage are:
*F.L. Olmsted, A Journey in the Back Country (London: 1860), 306-7.
**L.C. Gray, "Economic Efficiency and Competitive Advantages of Slavery under the Plantation System," Agricultural History, IV (April 1930), 41.
***Olmsted, A Journey in the Back Country, 310; The Cotton Kingdom, II (New York: 1861), 44; F. Lieber, Slavery, Plantations and the Yeomanry (New York: 1863), 5.

[4] Shugg, Origins of Class Struggle..., 26. His calculation is based on U.S. Census, 1860, Agriculture, 230.

[5] William E. Highsmith, "Louisiana Landholding During War and Reconstruction," The Louisiana Historical Quarterly, XXXVIII, No. 1 (Jan. 1955), 39.

[6] Enoch M. Banks, The Economics of Land Tenure in Georgia, Studies in History, Economics and Public Law, Vol. XXIII, No. 1 (New York: Columbia University Press, 1905), 24.

[7] Ibid., 83.

[8] A Scotch-Irishman [pseud.], The Mountain Whites of the South (Pittsburgh, Pa.: James McMillan, printer, 1893), pp. 14-15. The quoted passage is from J.R. Gilmore (n.p., n.d.). The Mountain Whites of the South is a collection of articles reprinted from the Presbyterian Banner of Pittsburgh, Pa., with a letter from Rev. John Hall of New York, to the Banner.

[9] Ulrich B. Phillips, "Plantations with Slave Labor and Free," Agricultural History, XII, No.1(Jan. 1938), 85.

[10] Ibid., 86.

[11] Albert Bushnell Hart, The Southern South (New York and London: D. Appleton and Company, 1910), 35.

[12] Ibid., 38

[13] Ibid., 263.

[14] Timothy Thomas Fortune, Black and White: Land, Labor and Politics in the South (New York: Fords, Howard & Hulbert, 1884; reprinted by Arno Press and the New York Times, New York: 1968), 199.

[15] See also Walter Fleming, Documentary History of Reconstruction: Political, Military, Social, Religious, Educational and Industrial, 1865 to the Present Time. (2 Vols., Cleveland: Arthur H. Clark Company, 1907), II, 273 and 320. Fleming is reprinting here segments of Nordhoff, Cotton States, 10, 21, 55, 76, 96, and 107.

[16] Carl Schurz, Report on the Condition of the South (New York: Arno Press and the New York Times Reprint, 1969), 15. The original Schurz Report was U.S. Senate Ex. Doc. No. 2, 39th Cong., 1st Sess., submitted Dec. 19, 1865.

[17] Fleming, Documentary History..., 301, citing Leigh, Ten Years on a Georgia Plantation (1866).

[18] Fleming, Documentary History..., 309, citing Mrs. V.V. Clayton, White and Black under the Old Regime, 172.

[19] Fleming, Documentary History..., 439, citing C.G. Smith, Colonization of Negroes in Central Alabama (Pamphlet from about 1900).

[20] Philip A. Bruce, The Plantation Negro as Freeman (New York & London: G.P. Putnam's Sons, the Knickerbocker Press, 1889), 177. This passage is embedded in a longer quote given in full in Chapter II.

[21] Robert Somers, Southern States Since the War, 1870-71 (London and New York: Macmillan and Co., 1871), 146.

[22] Marjorie S. Mendenhall, "The Rise of Southern Tenancy," Yale Review, Vol. 27, No. 1 (Autumn, 1937), 125.

[23] U.S. Congress, Joint Committee on Reconstruction, Report of the Joint Committee on Reconstruction, 39th Cong., 1st Sess. (Washington: Government Printing Office, 1866), Part III, 6. Testimony of Brevet Major General Edward Hatch. This report will hereafter be reffered to as the RJCR.

[24] U.S. Industrial Commission, Reports of the Industrial Commission, Vol. X: Report of the Industrial Commission on Agriculture and Agricultural Labor (Washington: Government Printing Office, 1901), 379. Testimony of J.H. Hale, farmer, of Fort Valley, Georgia, and South Glastonbury, Connecticut. This volume of the Industrial Commission's Reports will hereafter be referred to as ROIC, X.

[25] U.S. Census Office, Report on the Productions of Agriculture as Returned at the Tenth Census (June 1, 1880), Vol. III of 1880 Census (Washington: Government Printing Office, 1883), xviii.

[26] Somers, Southern States..., 116.

[27] Ibid.

[28] Ibid., 117. In these three passages, Somers was speaking specifically of conditions he found in Tennessee, though there is no reason why his comments cannot be taken as applying more generally.

[29] Ibid., 272-3.

[30] Henry W. Grady, "Cotton and Its Kingdom," Harper's New Monthly Magazine, LXIII (Oct. 1881), 721-2.

[31] Earnest Hamlin Abbott, "The South and the Negro," Outlook, Vol. 77 (1904), 228.

[32] Matthew Brown Hammond, "Cotton Production in the South," The South in the Building of the Nation, Vol. VI, prepared by The Southern Historical Publication Society (Richmond: 1909), 89. This volume will hereafter be referred to as SBN, VI.

[33] Johnd D. Hicks, The Populist Revolt (University of Nebraska Press, 1961; originally published by the University of Minnesota Press in 1931), 37-8. Hicks, in addition to citing Grady's Harper's article (Note 30) dealing with the acquisition of plantation lands by freedmen and whites, refers also to Francis B. Simkins, The Tillman Movement in South Carolina (Durham, North Carolina: 1926), 8-9; and Robert P. Brooks, The Agrarian Revolution in Georgia, 1865-1912 (Madison, Wisconsin: 1914), Ch. 3.

[34] Vernon Wharton, The Negro in Mississippi, 1865-1890, Vol. 28 of The James Sprunt Studies in History and Political Science (Chapel Hill: University of North Carolina Press, 1947), 104. Wharton's references are to the Hinds County Gazette, Feb. 17, 24, March 17, Dec. 15, 29, 1875; Feb. 6, 1878; and it is interesting to note that another one of Wharton's sources is Somers, Southern States..., 142-3.

[35] Shugg, Origins of Class Struggle..., 255, citing Lockett MS, 215-7.

[36] Ibid., 276-7. The references are
* [New Orleans] Picayune (Sept. 3, 1867).
** Ibid., (Sept. 5, 1873).

[37] An Old Beginner [pseud.], "Labor, Mode of Managing, &c.," Southern Cultivator, XXX (April, 1872), 27-8.

[38] "The Labor Question," ibid., XXXII (Oct. 1874), 390. The article originally appeared in DeBow's Review (Feb. 1870).

[39] ROIC, X, 909, testimony of the Hon. O.B. Stevens.

[40] Orra Langhorne, "A Poor White Man's Experience Since the War," Southern Workman, X (April 1881), 38.

[41] C.W. Tebeau, "Some Aspects of Planter-Freedman Relations, 1865-1880," Journal of Negro History, XXI, No. 2 (April 1936), 131; Oscar Zeichner, "The Transition from Slave to Free Agricultural Labor in the Southern States," Agricultural History, XIII (Jan. 1939), 22-32. Zeichner gives several references for this sentiment among the freedmen.

[42] Frederick Douglass, Life and Times of Frederick Douglass (New York: Bonanza Books, reprinted from the Revised Edition of 1892), 503-4. The passage was taken from a speech delivered by Douglass at Elmira, New York, Aug. 1, 1880, to a meeting of blacks celebrating West Indian emancipation.

[43] RJCR, Part III, 174-5.

[44] Ibid., 175.

[45] Thaddeus Stevens, "Reconstruction," (Lancaster, Pa.: Examiner & Herald Printers, 1865). This speech was originally delivered in Lancaster on Sept. 7, 1865.

[46] For an example of rotation, see J.A.H., "Cotton and Corn--Rotation Of," Southern Cultivator, XXXII (June, 1874), 212; for an example

of side-by-side cultivation, see Thomas E. Gregg, "Tobacco--Sweet Potatoes --Cotton and Corn Together," Southern Cultivator, XXXVI (June 1878), 212. These are typical examples, and other farmers wrote to the Cultivator reporting the same practices. And all the propaganda in favor of agricultural diversification would have been ridiculous if there had not been some flexibility in the crop choice. At least some cotton land must have been suitable for growing other crops.

VII. COTTON SUPPLY FUNCTIONS, 1882-1914

A. The Model

The results of the previous chapters were based on production functions estimated from cross-section data. As such, these results reveal nothing about the price-responsiveness of Southern farmers, or about the rationality or irrationality of their crop-choice decisions over time. It has been shown that there was an over-all productivity advantage in value terms associated with cotton culture, and it was hypothesized that this advantage was a manifestion of cotton's comparative advantage in the South. Nevertheless the relative prices of the different crop outputs varied over the years; and even if cotton enjoyed a comparative advantage, variation in relative prices in a flexible system of agriculture would produce variation in the crop mix as marginal lands were shifted between crops in response to the price changes.

It has already been pointed out (Chapter I) that the price-responsiveness of farmers constituted one aspect of the question of "overproduction" of cotton. The South may have suffered from "overproduction" if cotton was not profitable in the aggregate or if farmers clung to cotton production in the face of adverse price movements of their staple. The first possibility has been shown to be unlikely. Whether the second potential cause of overproduction was farmers' irrationality and traditionalism, or merchants' insistence on cotton, it would have been manifested in an unresponsiveness of cotton supply to changes in

the relative prices of cotton and the alternative crops. Under these circumstances, farmers might be said to have been "locked in" to cotton culture, and this conjecture will be referred to as the "Lock-in Hypothesis." Estimates of cotton supply functions for each state based on time series data should provide enough information for a judgement about price-responsiveness, and therefore should contribute materially to the (somewhat belated) settlement of the overproduction debate.

The supply model to be used has been applied many times, and in widely different agricultural settings [1]. In this model, either acreage in cotton or proportion of tilled acres in cotton is the dependent variable, serving as a measure of cotton supply. The model includes both a mechanism for formation of price expectations and one for the adjustment of planted acreage to desired acreage with lags. The final equation which is estimated can be derived from several different "underlying" behavioral models, but it is useful to examine one such model in detail in order to determine just what the estimates can and cannot reveal about the decision-making process. In what follows, the random disturbance term will not be included until later, because there is no reason for believing <u>a priori</u> that a statistical disturbance with desirable properties should appear at any one particular stage of the derivation as contrasted with any other.

The behavioral equations of the model are

$$X_t^* = \alpha + \beta P_t^e + \delta t \qquad (7\text{-}1)$$

$$X_t = X_{t-1} + \gamma(X_t^* - X_{t-1}) \tag{7-2}$$

$$P_t^e = P_{t-1}^e + \lambda(P_{t-1} - P_{t-1}^e) \tag{7-3}$$

where

X_t^* = the cotton acreage level desired by the agriculturalists in year t. There are two forms of the model: one in which $X_t^* = S_t^*$ = the desired proportion of total acres in cotton, the other in which $X_t^* = A_t^*$ = desired total acres in cotton.

P_t^e = expected cotton price relative to an index of the prices of the major alternative crops in year t, and

X_t and P_t are the actual or realized values of these quantities in the year t.

Equation (7-1) is the cotton supply function, in which the desired total cotton acreage (or proportion of acreage relative to other crops) is a function of the expected relative price including a trend. Equation (7-2) shows the speed at which actual planted acreage adjusts to desired acreage, with γ the speed of adjustment, while equation (7-3) describes the formation of price expections, with λ the speed of adjustment.

The variables can be measured either in their natural units or in logarithms. In this chapter, they are all measured in logarithms except for t, so that the parameters can be interpreted directly as elasticities. For example, the parameter β is the elasticity of the desired cotton acreage or proportion of acreage with respect to expected relative price.

X_t^* and P_t^e are unobservable, and must be eliminated before the model's parameters can be estimated. Easy algebraic manipulation shows that from (7-2)

$$X_t^* = \frac{1}{\gamma}(X_t - X_{t-1}) + X_{t-1} \tag{7-4}$$

Multiplying both sides of (7-3) by β and rearranging,

$$\beta P_t^e = (1-\lambda)\beta P_{t-1}^e + \lambda\beta P_{t-1} \tag{7-5}$$

From (7-1), (7-1) lagged, and (7-5)

$$X_t^* - \alpha - \delta t = (1-\lambda)[X_{t-1}^* - \alpha - \delta(t-1)] + \lambda\beta P_{t-1} \tag{7-6}$$

From (7-4), (7-4) lagged, and (7-6)

$$\frac{1}{\gamma}(X_t - X_{t-1}) + X_{t-1} - \alpha - \delta t \tag{7-7}$$

$$= (1-\lambda)[\frac{1}{\gamma}(X_{t-1} - X_{t-2}) + X_{t-2} - \alpha - \delta(t-1)] + \lambda\beta P_{t-1}$$

Multiplying both sides by γ and rearranging terms in (7-7),

$$X_t = (\alpha\gamma\lambda + \gamma\delta - \gamma\delta\lambda) + \beta\gamma\lambda P_{t-1} + [(1-\gamma) + (1-\lambda)]X_{t-1} \tag{7-8}$$

$$-[(1-\gamma)(1-\lambda)]X_{t-2} + \delta\gamma\lambda t$$

Now since γ and λ enter eq. (7-8) symmetrically, models in which either γ or $\lambda = 1$ will be observationally indistinguishable. Furthermore, suppose the estimated coefficient of X_{t-1} is a and the estimated coefficient of X_{t-2} is b. Then

$$[(1-\gamma) + (1-\lambda)] = a \tag{7-9}$$

$$-(1 - \gamma)(1 - \lambda) = b \tag{7-10}$$

So

$$-(1 - \gamma)[a - (1 - \gamma)] = b \tag{7-11}$$

$$\gamma^2 + (a - 2)\gamma + (1 - a - b) = 0 \tag{7-12}$$

$$\gamma = \frac{(2 - a) \pm \sqrt{a^2 + 4b}}{2} \tag{7-13}$$

Similarly

$$\lambda = \frac{(2 - a) \mp \sqrt{a^2 + 4b}}{2} \tag{7-14}$$

In principle, therefore, estimates of (7-8) could be used to calculate γ and λ, but there would be no way of determining which was which. In fact the data suggest that either γ or λ is one. Estimates of (7-8) give coefficients of X_{t-1} and X_{t-2} which together imply values of γ and λ which in every case but one are imaginary or outside the range from 0 to 1. In addition, the quasi-t-statistics [2] of the coefficients of X_{t-2} are generally small. These two facts indicate that either γ or λ is equal to one, though it is impossible to determine which. Fisher and Temin reached the same conclusion in their study of the supply of wheat in the United States over roughly the same period:

> We estimated such equations [including a term corresponding to X_{t-2}] for every state, but in no case did we find the coefficient of the additional term to differ significantly from zero. Moreover, we generally found that the estimated coefficients could not have been generated by models of this type with real values of the μ's [the respective speeds of adjustment, corresponding to γ and λ in the notation of this chapter], let alone with μ's between zero and one. Accordingly, we conclude that if such models are believed, then either price expectations or plantings are adjusted very rapidly [3].

TABLE VII.1

Simultaneous Estimation of γ and λ [S_t form], 1884-1914

$$S_t = c_1 + c_2 P_{t-1} + c_3 t + aS_{t-1} + bS_{t-2} + u_t; \quad u_t = \rho u_{t-1} + v_t$$

State	a	b	$a^2 + 4b$	γ, λ
North Carolina [quasi-t]	.651	-.255 [-1.922]	-.596	γ, λ not real
South Carolina	.767	-.342 [-2.621]	-.780	"
Georgia	.920	-.386 [-2.388]	-.698	"
Florida	.577	-.138 [-.856]	-.219	"
Tennessee	.953	-.303 [-1.603]	-.304	"
Alabama	.656	-.311 [-2.174]	-.814	"
Mississippi	.518	.0958 [.594]	.652	$\gamma, \lambda = 1.145, .338$
Arkansas	.613	-.0527 [-.296]	.165	$\gamma, \lambda = .897, .491$
Louisiana	.881	-.236 [-1.362]	-.168	γ, λ not real
Texas	.453	-.151 [-.944]	-.399	"

S_t = proportion of total acres planted to cotton; S_t and P_t in logs. The numbers in square brackets below the b estimates are the quasi-t statistics for testing the hypothesis that the true coefficient is zero. u_t is a first-order autocorrelated disturbance, the v_t are uncorrelated.

TABLE VII.2

Simultaneous Estimation of γ and λ [A_t form], 1884-1914

$$A_t = c_1 + c_2P_{t-1} + c_3t + aA_{t-1} + bA_{t-2} + u_t; \quad u_t = \rho u_{t-1} + v_t$$

State	a	b	$a^2 + 4b$	γ, λ
North Carolina [quasi-t]	.645	-.301 [-2.281]	-.788	γ, λ not real
South Carolina	.492	-.235 [-1.684]	-.698	"
Georgia	.705	-.193 [-1.113]	-.275	"
Florida	.631	-.252 [-1.371]	-.610	"
Tennessee	.751	-.211 [-1.212]	-.280	"
Alabama	.747	-.283 [-1.865]	-.574	"
Mississippi	.0901	-.0293 [-.177]	-.109	"
Arkansas	.390	-.106 [-.636]	-.272	"
Louisiana	.630	.0245 [.144]	.495	γ, λ = 1.037, .333
Texas	.659	.145 [.763]	1.014	γ, λ = 1.174, .167

A_t = total acres planted to cotton. Other comments are the same as in the previous table.

Thus (7-8) reduces to

$$X_t = \alpha\mu + \beta\mu P_{t-1} + \delta\mu t + (1-\mu)X_{t-1} \qquad (7\text{-}15)$$

where all variables and parameters are as previously defined, except for μ. Since it is impossible to determine which of the two speeds of adjustment is unity and which is not, μ will denote the speed of adjustment which is less than one, and will subsequently be referred to simply as "the" speed of adjustment. For purposes of testing the price-responsiveness of the agricultural system, it really makes little difference whether acreage allotments or price expectations are adjusted. Merchants insisting on cotton culture can be thought of as being decision-makers who prevented farmers from shifting crops to the desired alternatives to cotton, or as decision-makers who maintained optimistic expectations of the relative cotton price, thus insisting on continuation of its culture. In other words, the identification of which speed of adjustment is equal to one and which is not is really not important for the problem at hand--the determination of whether or not the supply of cotton responded to price changes or was restrained from responding because farmers were "locked in" to cotton.

It was mentioned previously that there is no a priori reason for introducing a statistical disturbance term at any particular stage of the derivation of (7-8). If a disturbance which is not autocorrelated is introduced in the underlying model (e. g. in (7-11)), then the disturbance which will be present in (7-8) or (7-15) will be autocorrelated.

This can be seen by carrying the disturbance through the derivation of (7-8). Alternatively, if the disturbance term is first introduced in (7-15), there is no a priori reason why it should not be autocorrelated. Therefore it will be assumed that the disturbance is linearly autocorrelated, so that the final equation which is estimated is:

$$X_t = \alpha\mu + \beta\mu P_{t-1} + \delta\mu t + (1-\mu)X_{t-1} + u_t \qquad (7\text{-}16)$$

$$u_t = \rho u_{t-1} + v_t \qquad (7\text{-}17)$$

with the v_t uncorrelated.

Up to this point it has been assumed that (7-16) and (7-17) were derived from an underlying behavioral model embodied by equations (7-1)-(7-3) combined with the least restrictive assumptions about the disturbance (except for confining it to no higher than first-order autocorrelation). In this case, estimation of (7-8) shows that adjustment either of price expectations or of the difference between desired and actual planted acreages was very rapid. However, it is also possible that (7-16) itself is the appropriate behavioral equation--that the current level or percentage of cotton acreage was determined by the previous period's relative price and the previous year's level of the dependent variable. If so, the model includes only one speed of adjustment: μ. In both cases the coefficient of P_{t-1} is the short-run elasticity with respect to price.

The long-run elasticity with respect to price can also be determined. In a model such as this one, which includes a trend term, the condition

for long-run equilibrium is that X_t be growing smoothly according to trend; i.e. that

$$X_t - X_{t-1} = \delta \qquad (7\text{-}18)$$

The logarithmic difference $X_t - X_{t-1}$ is the proportional rate of growth in period terms, and the rate of growth of the desired level X_t^* in the underlying model is δ. Because the model is one of adaptive expectations, it is not possible to achieve $X_t = X_t^*$ in long-run equilibrium. $X_t = X_t^*$ would require $X_t = X_{t-1}$ from (7-2), provided $\gamma \neq 0$. But in long-run equilibrium, X_t continues to grow because of the trend factor. There actually is no paradox here. In the "steady state" long-run equilibrium, the desired level X_t^* grows with trend, and X_t can never quite "catch up" to it because X_t adjusts only with a lag (see (7-2)). Equilibrium is reached, however, when X_t is growing at the steady trend rate δ. Thus, for any given price level $\bar{P}$, substitution of (7-18) into (7-16) gives for long-run equilibrium $\bar{X}_t$,

$$\bar{X}_t = \left[\alpha - \frac{(1-\mu)\delta}{\mu}\right] + \beta \bar{P} + \delta t \qquad (7\text{-}19)$$

Thus β is the long-run elasticity of $\bar{X}_t$ with respect to price. Note that $\bar{X}_t$ is slightly smaller than X_t^*, reflecting that X_t can never quite "catch up" to its desired level, even in long-run equilibrium.

B. The Results

Parameter estimates corresponding to both forms of (7-16) are given in the following tables. In these tables S_t = the share of total acres in cotton and A_t = total cotton acreage in year t. The span of time covered by the estimates is 1883-1914. The starting-point was chosen because the yearly USDA cotton price series does not begin until 1882, and the final year to avoid possible structural changes accompanying World War I. 1883-1914 also includes roughly the period covered by the production function estimates. Several interesting points emerge:

(1) Both forms of the supply function show a relatively good fit, with the coefficients of both the price and lagged dependent variables positive as expected in every case.

(2) In both models, the coefficient of P_{t-1} is almost always quasi-significant. (See notes to the tables of results for a definition of"quasi-significant".) Combined with the result that the sign is always positive, this provides strong evidence that the Southern cotton farmers during this period were definitely sensitive to changes in the relative prices of cotton and the main alternative crops. Determination of the strength and magnitude of these responses must wait for the subsequent analysis of the relative sizes of the short- and long-run price elasticities.

(3) In the A_t model, 9 out of 10 of the coefficients of the trend are positive, and in the S_t model, 7 out of 10 of these coefficients are positive. This indicates that there was an over-all trend of increasing total acreage devoted to cotton, and that a majority of states gave increasing shares of the USDA major crop-acreage over to cultivation of

cotton. By itself this is an interesting finding. However, it gives no real help in settling the "overproduction" dispute, because a positive trend to cotton acreage is consistent with both the Rational Crop Choice Hypothesis and the "Lock-in" Hypothesis. If merchants insisted that any farmer who fell into the toils of debt grow cotton and continue to grow cotton, the ordinary variance in farmers' fortunes would cause a few more each year to become caught in the cotton trap. On the other hand, if the world demand for cotton was rising with general economic growth, the Southern farmers would be expected to expand its output at the same time. The only way the competing hypotheses can be distinguished, therefore, is by further analysis of the response coefficients themselves, and in particular by comparison of cotton farmers' flexibility with the price-responsiveness of other farmers who clearly were not locked in to production of a cash crop.

To this end it is possible to obtain another measure of the speed of adjustment of the cotton supplier based on the estimates of the parameter μ for each state. This measure amounts to determining how much of the total adjustment of the dependent variable in response to a once-and-for-all price change would have taken place after a given number of years. Ignoring the disturbance, rewrite (7-16):

$$X_t = \alpha\mu + \beta\mu P_{t-1} + \delta\mu t + (1 - \mu)X_{t-1}$$

Assume that at $t = \tau$, the suppliers were in long-run equilibrium at relative price level P. Now assume a once-and-for-all shift in the price level to P'. After n years,

TABLE VII.3

Cotton Supply Functions, 1883-1914 [S_t form]

$$S_t = \alpha\mu + \beta\mu\, P_{t-1} + \delta\mu\, t + (1-\mu)S_{t-1} + u_t \;;$$

$$u_t = \rho u_{t-1} + v_t; \text{ all variables in logs except t.}$$

Estimated Parameter	North Carolina	South Carolina	Georgia	Florida
$\alpha\mu$ (s.e.)	-9.186(3.983)	-2.763(1.364)	-4.176(2.117)	9.664(3.076)
[quasi-t]	[-2.306]	[-2.025]	[-1.972]	[3.142]
$\beta\mu$	.318(.0598)	.126(.0265)	.134(.0385)	.149(.0376)
	[5.323]	[4.745]	[3.473]	[3.975]
$\delta\mu$	.00419(.00205)	.00117(.000692)	.00191(.00108)	-.00562(.00170)
	[2.046]	[1.695]	[1.758]	[-3.298]
$1-\mu$	.591(.139)	.576(.131)	.589(.147)	.464(.121)
	[4.247]	[4.386]	[4.015]	[3.823]
ρ	.383	.0390	.108	-.343
β	.778	.297	.326	.278
δ	.0102	.00276	.00465	-.0105
μ	.409	.424	.411	.536
R^2	.827	.713	.734	.695
F(3,27)	42.921	22.333	24.775	20.477

TABLE VII.3 -- Continued

Cotton Supply Functions, 1883-1914 [S_t form]

Estimated Parameter	Tennessee	Alabama	Mississippi
$\alpha\mu$	-3.974(3.380) [-1.176]	-2.738(1.407) [-1.946]	4.736(2.855) [1.659]
$\beta\mu$	.321(.0767) [4.191]	.114(.0266) [4.288]	.116(.0298) [3.894]
$\delta\mu$	.00147(.00179) [.817]	.00116(.000704) [1.652]	-.00277(.00151) [-1.834]
$1-\mu$	.747(.130) [5.728]	.539(.169) [3.181]	.453(.166) [2.735]
ρ	.220	-.0829	.550
β	1.269	.247	.212
δ	.00581	.00252	-.00506
μ	.253	.461	.547
R^2	.711	.683	.709
F(3,27)	22.119	19.403	21.912

TABLE VII.3 -- Continued

Cotton Supply Functions, 1883-1914 [S_t form]

Estimated Parameter	Arkansas	Louisiana	Texas
$\alpha\mu$	-2.801(2.672) [-1.048]	11.198(7.431) [1.507]	-12.170(4.734) [-2.571]
$\beta\mu$	.160(.0476) [3.371]	.133(.0468) [2.851]	.0995(.0317) [3.137]
$\delta\mu$	.00110(.00139) [.795]	-.00615(.00394) [-1.562]	.00614(.00245) [2.505]
$1-\mu$	.560(.157) [3.553]	.679(.159) [4.267]	.457(.174) [2.618]
ρ	.147	.590	.0842
β	.364	.414	.183
δ	.00250	-.0192	.0113
μ	.440	.321	.543
R^2	.544	.886	.910
F(3,27)	10.748	69.761	90.955

TABLE VII.4

Cotton Supply Functions, 1883-1914 [A_t form]

$$A_t = \alpha\mu + \beta\mu P_{t-1} + \delta\mu t + (1-\mu)A_{t-1} + u_t \ ;$$

$$u_t = \rho u_{t-1} + v_t \ ; \quad \text{all variables in logs except t.}$$

Estimated Parameter	North Carolina	South Carolina	Georgia	Florida
$\alpha\mu$ (s.e.)	-6.509(3.504)	-8.477(2.546)	-11.255(3.892)	.0644(3.211)
[quasi-t]	[-1.857]	[-3.329]	[-2.892]	[.0201]
$\beta\mu$	.327(.0637)	.156(.0384)	.179(.0526)	.147(.0511)
	[5.140]	[4.054]	[3.407]	[2.878]
$\delta\mu$	.00491(.00215)	.00661(.00188)	.00765(.00264)	.00148(.00178)
	[2.281]	[3.525]	[2.900]	[.832]
$1-\mu$	.512(.144)	.429(.144)	.560(.146)	.419(.146)
	[3.542]	[2.973]	[3.830]	[2.876]
ρ	.338	-.0925	-.0789	-.184
β	.670	.273	.407	.253
δ	.0101	.0116	.0174	.00255
μ	.488	.571	.440	.581
R^2	.818	.910	.926	.484
F(3,27)	40.447	91.387	112.538	8.429

TABLE VII.4 -- Continued

Cotton Supply Functions, 1883-1914 [A_t form]

Estimated Parameter	Tennessee	Alabama	Mississippi
$\alpha\mu$	-.248(3.758) [-.0660]	-5.345(2.251) [-2.374]	5.509(8.449) [.652]
$\beta\mu$	.330(.0729) [4.525]	.166(.0416) [3.988]	.152(.0434) [3.512]
$\delta\mu$	.00110(.00188) [.585]	.00453(.00177) [2.564]	.000645(.00453) [.142]
$1-\mu$	.618(.144) [4.305]	.558(.151) [3.686]	.126(.175) [.720]
ρ	.295	-.208	.766
β	.864	.376	.174
δ	.00288	.0102	.000738
μ	.382	.442	.874
R^2	.662	.876	.809
$F(3,27)$	17.596	63.635	38.175

TABLE VII.4 -- Continued

Cotton Supply Functions, 1883-1914 [A_t form]

Estimated Parameter	Arkansas	Louisiana	Texas
$\alpha\mu$	-12.198(4.360) [-2.798]	4.421(8.363) [.529]	-9.746(9.082) [-1.073]
$\beta\mu$	.143(.0560) [2.557]	.192(.0665) [2.885]	.0812(.0434) [1.870]
$\delta\mu$	.00885(.00285) [3.102]	-.00129(.00439) [-.294]	.00578(.00528) [1.096]
$1-\mu$	.348(.164) [2.123]	.674(.158) [4.261]	.848(.107) [7.953]
ρ	.0591	.574	-.377
β	.219	.589	.534
δ	.0136	-.00396	.0380
μ	.652	.326	.152
R^2	.834	.802	.984
F(3,27)	45.345	36.363	558.040

TABLES VII.3 - VII.4 -- Continued

Notes to the Tables

(a) The estimation technique used was identical to that of Fisher and Temin's study of wheat supply [4]. Their discussion can hardly be improved upon, and is quoted here with appropriate changes in notation and numbering of the equations:

> [Equation (7-16) was estimated] by choosing ρ so as to minimize the sum of squares of the v_t over all but the first observation. In other words, given ρ, [(7-16) was lagged and multiplied by ρ, the product was subtracted from the original equation, and ordinary least squares was applied], choosing that value of ρ which gave the smallest resulting error sum of squares. This procedure uses the first observation only as a subtraction from the second. If one believes that the process generating the disturbances...was going on for a long time when the observation period started, [then this] procedure differs from maximum likelihood (assuming the v_t normally distributed in the usual way) in its treatment of the first observation, but is asymptotically equivalent to maximum likelihood. If, on the other hand, one believes that disturbances in the recent past before the first observation were differently generated, then [this] procedure yields the maximum likelihood estimator even in small samples...[5].

(b) The standard errors and t-statistics (shown in ordinary parentheses and square brackets respectively) were calculated as if the serial coefficient ρ were given, and not estimated along with the other parameters. Cooper has shown that when all independent variables are exogenous this procedure is asymptotically valid, but in the presence of a lagged dependent variable (as in the present case) the standard errors of the regression coefficients will be biased downward even asymptotically. He has also derived a correction which gives asymptotically unbiased estimates of the standard errors of the regression coefficients even in the presence of a lagged dependent variable [6]. Unfortunately, quantities which are

TABLES VII.3 - VII.4 -- Continued

zero in the probability limit are not zero in the small samples (32 observations) involved here. The version of the Cooper correction in the regression program package employed [7] uses only the asymptotically correct formulas, and thus generates meaningless statistics (such as negative "variances") for several of the state supply functions.

For this reason the Cooper correction was not applied. Thus the reported standard errors are biased downward and the reported "t-statistics" are actually only "quasi-t-statistics." A parameter estimate will be described as "quasi-significant" at a particular level if it would have been significant at that level had its approximate and biased standard error been exact. It should be noted that the sample sizes of the Fisher and Temin wheat supply study were generally large enough for the asymptotic properties of the Cooper correction to be rougly valid; hence their "quasi-t statistics," while still only approximate, were based on standard errors to which the Cooper correction had been applied. Thus the standard errors in the cotton and wheat supply studies are not exactly comparable. These difficulties do not affect the actual parameter estimates, which are the only estimates that are compared between the two studies.

(c) Approximate methods do exist for calculating the standard error of the ratio of two regression coefficients. Also, the mean of such a ratio (under the usual assumptions about the disturbance) is approximately equal to the ratio of the means of the two coefficients [8]. The ratio standard errors would be useful in the subsequent comparison of β estimates for the cotton and wheat supply functions. However,

TABLES VII.3 - VII.4 -- Continued

given that (a) the standard errors of the cotton supply function parameter estimates are biased, and (b) the calculation of the ratio standard error involves the covariances of the estimated coefficients which are not reported in the published Fisher and Temin article, it was decided not to compute the ratio standard errors.

$$X_{\tau+n} = \alpha\mu + \beta\mu P' + \delta\mu(\tau+n) + (1-\mu)X_{\tau+n-1}$$

$$= \alpha\mu + \beta\mu P' + \delta\mu(\tau+n) + (1-\mu)[\alpha\mu + \beta\mu P' + \delta\mu(\tau+n-1) + (1-\mu)X_{\tau+n-2}] + \ldots$$

$$= [\alpha\mu + \beta\mu P' + \delta\mu\tau] \sum_{j=0}^{n-1}(1-\mu)^j + \delta\mu \sum_{j=0}^{n-1}(n-j)(1-\mu)^j + (1-\mu)^n X_\tau$$

$$= [\alpha + \beta P' + \delta\tau]\mu \sum_{j=0}^{n-1}(1-\mu)^j + \delta\mu \sum_{j=0}^{n-1}(n-j)(1-\mu)^j + (1-\mu)^n[c + \beta P + \delta\tau] \qquad (7\text{-}20)$$

where

$$c = \alpha - \frac{(1-\mu)\delta}{\mu}$$

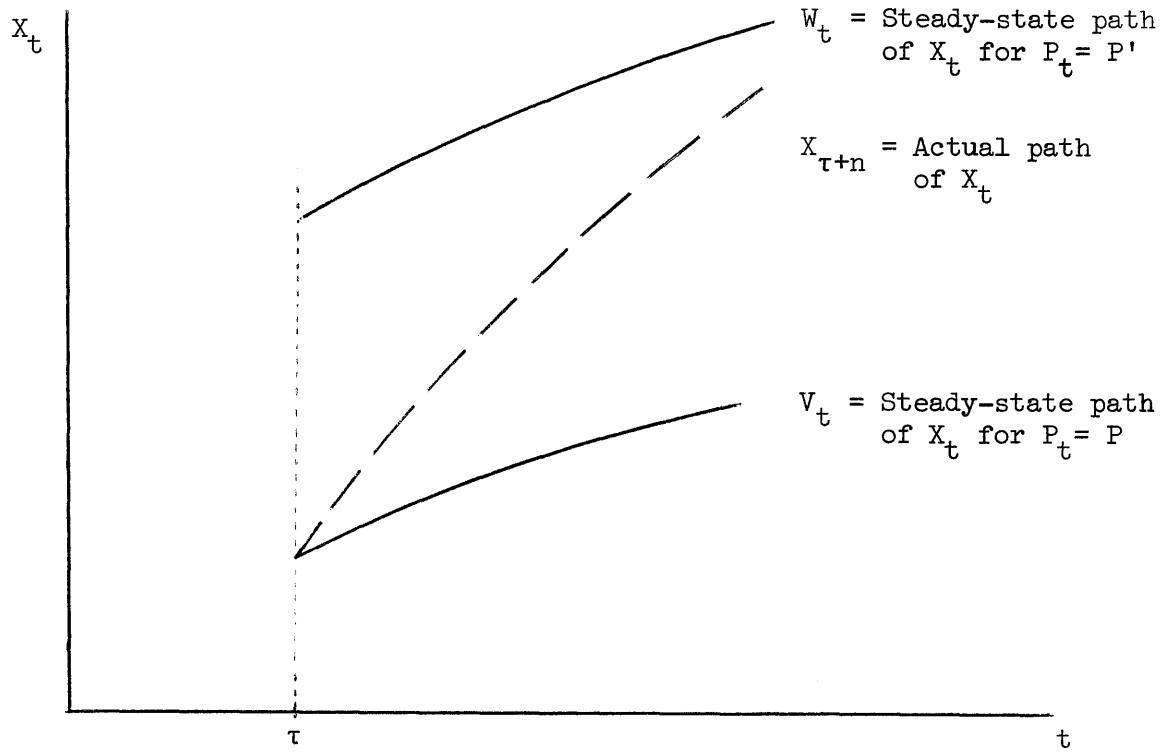
Now to calculate k(n), the proportion of the adjustment completed after n years, it is necessary to compare $X_{\tau+n}$ to what X would have been if the price had remained at P, as well as to the level X would have reached if it had achieved its long-run equilibrium value.

Define (see figure at the top of the next page)

$$k(n) = \frac{X_{\tau+n} - V_{\tau+n}}{W_{\tau+n} - V_{\tau+n}} \qquad (7\text{-}21)$$

Then

$$k(n) = \{(\alpha + \beta P' + \delta\tau)\mu \sum_{j=0}^{n-1}(1-\mu)^j + \delta\mu \sum_{j=0}^{n-1}(n-j)(1-\mu)^j + (1-\mu)^n[c + \beta P + \delta\tau] - [c + \beta P + \delta(\tau+n)]\} / \{[c + \beta P' + \delta(\tau+n)] - [c + \beta P + \delta(\tau+n)]\} \qquad (7\text{-}22)$$



Since

$$\sum_{j=0}^{n-1} (1-\mu)^j = \frac{1-(1-\mu)^n}{\mu},$$

(7-22) reduces to:

$$k(n) = \{[\alpha+\beta P' + \delta\tau][1-(1-\mu)^n] + \delta\mu \sum_{j=0}^{n-1} (n-j)(1-\mu)^j + (1-\mu)^n(c+\beta P+\delta\tau) - [c+\beta P+\delta(\tau+n)]\}/\beta(P'-P) \quad (7\text{-}23)$$

$$k(n) = \frac{(\alpha-c)+\beta(P'-P)-(1-\mu)^n[(\alpha-c)+\beta(P'-P)] - \delta n+\delta\mu \sum_{j=0}^{n-1}(n-j)(1-\mu)^j}{\beta(P'-P)} \quad (7\text{-}24)$$

Observe that if $\delta = 0$, k(n) reduces to:

$$k(n) = 1-(1-\mu)^n \quad (7\text{-}25)$$

Also, if δ is small and n is not too large (so that $\alpha \approx c$ and the last two terms in the numerator of (7-24) are small relative to the middle terms) then (7-25) will hold approximately. It should be noted that in this case k(n) does not depend on the magnitude of the price change at all. It can be seen from the estimates on pages 343 - 348 that δ is indeed small, exceeding .02 in only one case. For these reasons the convenient approximation (7-25) will be used to calculate k(n), rather than the exact expression (7-24). These approximate values of k(n) for n = 1 through 5 years are given in the following tables.

The table of k(n) for the S_t form of the supply function shows that every state but Tennessee and Louisiana would have completed over 90% of its final adjustment to even a substantial price change after only five years. After three years, all the states except these two would have completed over 3/4 of the final adjustment to a once-and-for-all price change. Calculating the unweighted average of the k(n) values for each state, it can be seen that the South as a whole would have completed 2/3 of its final adjustment to a relative price change after only two years, and over 80% of the final adjustment after three years. Essentially similar conclusions can be drawn from the k(n) values in the A_t model. These values of k(n) indicate that even though the cotton suppliers adjusted to price changes with a lag, there is no reason to believe that a state of chronic "overproduction" could have persisted over a period of 20 or 30 years in the face of a drop in the relative cotton price from its immediate post-war high.

TABLE VII.5

Approximate k(n) for n = 1 through 5, cotton supply functions in S_t form.

State	1	2	3	4	5
North Carolina	.409	.651	.794	.878	.928
South Carolina	.424	.668	.809	.890	.937
Georgia	.411	.653	.796	.880	.929
Florida	.536	.785	.900	.954	.978
Tennessee	.253	.442	.583	.689	.767
Alabama	.461	.709	.843	.916	.955
Mississippi	.547	.795	.907	.958	.981
Arkansas	.440	.686	.824	.902	.945
Louisiana	.321	.539	.687	.787	.856
Texas	.543	.791	.905	.956	.980
Over-all Average	.429	.667	.801	.879	.924

TABLE VII.6

Approximate k(n)for n = 1 through 5, cotton supply functions in A_t form.

State	1	2	3	4	5
North Carolina	.488	.738	.866	.931	.965
South Carolina	.571	.816	.921	.966	.985
Georgia	.440	.686	.824	.902	.945
Florida	.581	.824	.926	.969	.987
Tennessee	.382	.618	.764	.854	.910
Alabama	.442	.689	.826	.903	.946
Mississippi	.874	.984	.998	1.000	1.000
Arkansas	.652	.879	.958	.985	.995
Louisiana	.326	.546	.694	.794	.861
Texas	.152	.281	.390	.483	.561
Over-all Average	.491	.706	.817	.879	.916

The results presented so far are suggestive of the price-responsiveness of cotton farmers, but as such they provide no absolute test of either the Lock-in Hypothesis or the Rational Crop Choice Hypothesis. Without some standard of comparison it is not possible to say whether the long- and short-run elasticities displayed for each state's cotton supply function are large or small. The only way such a determination can be made is by comparing the elasticities with similar parameters estimated for a different group of farmers.

The material for such a comparison, fortunately, is at hand. Fisher and Temin have estimated nearly identical models of the supply of wheat from the wheat-producing states in the United States during roughly the same period covered in the cotton supply estimates. In the comparisons that follow, both cotton and wheat supply functions are of the form of equation (7-16) with X_t = share of total harvested acres in cotton or wheat. The sample in the Fisher and Temin estimates is from 1866-1914, which includes the 1882-1914 period but extends beyond it, because the wheat price received by farmers was available for the earlier years while a comparable cotton price was available yearly only starting in 1882 [9].

There is one striking difference in pattern between the wheat supply functions and the cotton supply functions. For 13 wheat supply functions out of 17 the coefficient of the trend is negative, indicating that the trend in these states was to shift out of wheat rather than to specialize in it more heavily. Certainly the argument that Northern

TABLE VII.7

Fisher and Temin Wheat Supply Functions, 1866-1914 [S_t form]

$$S_t = \alpha\mu + \beta\mu P_{t-1} + \delta\mu t + (1-\mu)S_{t-1} + u_t \ ;$$

$$u_t = \rho u_{t-1} + v_t \ ; \text{ all variables in logs except t.}$$

Estimated Parameter	New York	Pennsylvania	Maryland	Virginia	Ohio
$\alpha\mu$	2.896	-.271	-2.154	-.789	.217
[quasi-t]	[1.17]	[.24]	[2.15]	[.50]	[.07]
$\beta\mu$	.121	.0453	.0704	.0712	.191
	[3.05]	[1.97]	[2.79]	[2.31]	[2.71]
$\delta\mu$	-.0021	-.0001	.0009	.0001	-.0007
	[1.54]	[.09]	[1.82]	[.09]	[.44]
$1-\mu$	.848	.909	.815	.784	.788
	[13.73]	[12.38]	[9.15]	[5.50]	[6.45]
ρ	-.435	-.221	.142	.283	-.019
β	.792	.498	.380	.329	.902
R^2	.960	.909	.859	.879	.741

TABLE VII.7 -- Continued

Fisher and Temin Wheat Supply Functions, 1866-1914 [S_t form]

Estimated Parameter	Michigan	Indiana	Illinois	Wisconsin	Missouri
$\alpha\mu$	9.401 [1.20]	24.394 [2.36]	6.493 [1.04]	36.441 [2.56]	2.806 [.94]
$\beta\mu$	.277 [3.57]	.0229 [.32]	.0488 [.65]	.284 [3.40]	.0278 [.87]
$\delta\mu$	-.0058 [1.41]	-.0136 [2.43]	-.0038 [1.14]	-.0203 [2.67]	-.0019 [1.00]
$1-\mu$	.755 [5.85]	.0682 [.19]	.720 [4.81]	.728 [7.49]	.590 [4.42]
ρ	.100	-.005	-.386	-.098	.331
β	1.132	.0246	.174	1.043	.0678
R^2	.952	.605	.733	.987	.679

TABLE VII.7 -- Continued

Fisher and Temin Wheat Supply Functions, 1866-1914 [S_t form]

Estimated Parameter	Iowa	Minnesota	Kansas	Nebraska	South Dakota
$\alpha\mu$	6.570 [.16]	10.018 [1.77]	-18.306 [2.67]	-1.720 [.31]	6.196 [2.21]
$\beta\mu$	.162 [2.27]	.136 [5.10]	.249 [2.41]	.0852 [2.04]	.0804 [2.09]
$\delta\mu$	-.0040 [.18]	-.0057 [1.88]	.0090 [2.53]	.0007 [.23]	-.0035 [2.23]
$1-\mu$	.848 [2.32]	.765 [5.51]	.746 [4.32]	.929 [7.35]	.880 [10.92]
ρ	.535	.503	-.074	.227	-.058
β	1.067	.579	.982	1.198	.669
R^2	.982	.984	.682	.926	.926

TABLE VII.7 -- Continued

Fisher and Temin Wheat Supply Functions, 1866-1914 [S_t form]

Estimated Parameter	North Dakota	California
$\alpha\mu$	8.470 [1.90]	8.656 [2.25]
$\beta\mu$	.144 [2.62]	.0891 [.96]
$\delta\mu$	-.0049 [2.02]	-.0048 [2.39]
$1-\mu$	.650 [4.25]	.933 [20.12]
ρ	-.255	-.118
β	.412	1.336
R^2	.820	.975

farmers were locked in to wheat production cannot be made on the basis of this trend. The crucial comparison to make between the results, in light of this difference in trend, is between the respective price elasticities and speeds of adjustment.

Before making the comparison, consider what the alternative hypotheses would predict. In the "overproduction" case, farmers presumably were prevented from growing alternative crops because merchants who controlled short-term credit lines to the farmers insisted on cotton. The typical example would be the farmer who approached his merchant at the beginning of the year for supplies, and was told that unless he planted cotton, the credit would be withheld. The Lock - in Hypothesis would therefore predict that in the short run, cotton farmers' responsiveness to price changes would be weaker than that of Western wheat farmers. In the long run, the price elasticity of the cotton farmers would probably also be lower than the price elasticity of the wheat farmers. Most important, though, is that if farmers really were locked in to cotton, they must have been locked in in the short run, because the control of credit resulting in the cotton preference had to be exercised on a yearly basis. No one argues that farmers were instructed to grow cotton by bankers as a condition for extending long-term mortgage loans.

On the other hand, under the Rational Crop Choice Hypothesis it is the long-run price elasticity of cotton supply that would be lower than the elasticity of wheat supply, because if cotton had a long-run comparative advantage in the South, rational farmers would remain relatively specialized even in the face of a secular price decline. Thus long-term

price changes would have less effect on the cotton/non-cotton mix than would comparable changes in the relative prices of wheat and other Northern crops. In the short run, the predicted comparison of elasticities is not clear. Short-run elasticities in these models are lower than long-run elasticities, reflecting the lag in adjustment. Since the Southern lands were not completely cotton-specific, it might be expected that in the short run the first lands to shift from cotton to alternative crops in response to a price change would be the marginal lands, lands which enjoyed no great advantage in cotton culture due to physical or climatic factors. These marginal lands, presumably, would be easily shifted back and forth between crops in response to small short-run price changes. If Southern farmers were not locked in and were as rational in their crop choice decisions as Northern and Western farmers, there is no reason to expect that the short-run price elasticity of Southern suppliers should be any different from comparable parameters of the North and West.

Briefly, the Lock-in Hypothesis should predict lower short-run price elasticity for Southern cotton supply functions than for the wheat supply functions, possibly with lower long-run cotton price elasticity as well. On the other hand, the Rational Crop Choice Hypothesis predicts a lower long-run cotton price elasticity, and not necessarily any difference in short-run price elasticity between cotton and wheat supply functions.

Since of the three parameters--short-run price elasticity, speed of adjustment, and long-run price elasticity--only two are independent

(the third being a function of the other two), the discussion has been conducted in terms of the long- and short-run price elasticities. The discussion could equally well have been couched in terms of the speed of adjustment and the long-run price elasticity, or the speed of adjustment and the short-run price elasticity. In either case the Lock-In Hypothesis would predict a relatively <u>low</u> speed of adjustment for the cotton states as opposed to the wheat states. The Rational Crop Choice Hypothesis would make no prediction about the speed of adjustment, except that in combination with the short-run price elasticity, the resulting long-run elasticity should be low.

The status of the competing hypotheses is revealed most clearly when the various parameter estimates are ranked according to size: [See the following tables] these results support the Rational Crop Choice Hypothesis and are contrary to the predictions of the Lock-in Hypothesis. First of all, the short-run cotton price elasticities are all in the range of the upper half of the short-run price elasticities for wheat supply. Similarly the cotton states' speeds of adjustment are all in the upper range of the wheat states' speeds of adjustment. Both these results are in direct contradiction to what would be expected in a system locked in to cotton, though both are compatible with the Rational Crop Choice Hypothesis. In the case of long-run elasticities, however, with the exception of Tennessee and North Carolina, the Southern states' elasticities all lie in the lower range of wheat states' long-run elasticities. Tennessee and North Carolina are states on the border of the North and South. They are the two

states with the smallest proportions of their improved acres devoted to cotton. (See table of state-wide H/T values in Chapter IV.) It is in precisely these two states that cotton would be expected to have the weakest comparative advantage, and their relatively high long-run cotton price elasticities reflect this fact.

This is a strong result. The supply functions whose parameters were compared were identical in specification, including the error structure. They were estimated by identical techniques, even using the same computer program. The cotton supply functions and wheat supply functions behave similarly, except for the trend differences and parameter patterns discussed above. Both sets of supply functions fit the data well, and have coefficient signs and values which are plausible a priori. Nothing in the results contradicts the Rational Crop Choice Hypothesis; yet to find support for the lock-in effect in the South, it would be necessary to construct a tortuous explanation of the "paradoxical" results [10]. These findings show that the only way in which Southern cotton farmers' response to price was different from Western wheat farmers' was in the long run, when the over-all cotton productivity advantage in the region applied. On the basis of these supply functions, there is no evidence that Southern cotton farmers wer locked in to cotton culture against their will or contrary to rational supply responsiveness.

TABLE VII.8

Comparison of Short-Run Price Elasticities

Cotton			Wheat	
State	$\beta\mu$ = short run price elasticity =		$\beta\mu$	State
Tennessee	.321		.284	Wisconsin
			.277	Michigan
North Carolina	.318		.249	Kansas
			.191	Ohio
Arkansas	.160		.162	Iowa
			.144	North Dakota
Florida	.149		.136	Minnesota
			.121	New York
Georgia	.134		.0891	California
		Deep South Range	.0852	Nebraska
Louisiana	.133		.0804	South Dakota
			.0712	Virginia
South Carolina	.126		.0704	Maryland
			.0488	Illinois
Mississippi	.116		.0453	Pennsylvania
			.0278	Missouri
Alabama	.114		.0229	Indiana
Texas	.0995			

For these tables, the "Deep South" consists of South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana and Texas.

TABLE VII.9

Comparison of Long-Run Price Elasticities

Cotton			Wheat	
State	β	= long-run price elasticity =	β	State
Tennessee	1.269		1.336	California
North Carolina	.778		1.198	Nebraska
Louisiana	.414		1.132	Michigan
Arkansas	.364		1.067	Iowa
Georgia	.326		1.043	Wisconsin
South Carolina	.297		.982	Kansas
Florida	.278		.902	Ohio
Alabama	.247		.792	New York
Mississippi	.212		.669	South Dakota
Texas	.183		.579	Minnesota
			.498	Pennsylvania
			.412	North Dakota
			.380	Maryland
			.329	Virginia
			.174	Illinois
			.0678	Missouri
			.0246	Indiana

Deep South Range

TABLE VII.10

Comparison of Speeds of Adjustment

Cotton				Wheat
State	μ = speed of adjustment		= μ	State
Mississippi	.547		.932	Indiana
Texas	.543		.410	Missouri
Florida	.536		.350	North Dakota
Alabama	.461		.280	Illinois
Arkansas	.440	All-South Range	.272	Wisconsin
South Carolina	.424		.254	Kansas
Georgia	.411		.245	Michigan
North Carolina	.409		.235	Minnesota
Louisiana	.321		.216	Virginia
Tennessee	.253		.212	Ohio
			.185	Maryland
			.153	New York
			.152	Iowa
			.120	South Dakota
			.0909	Pennsylvania
			.0711	Nebraska
			.0667	California

NOTES TO CHAPTER VII

[1] See, for example, Marc Nerlove, The Dynamics of Supply: Estimation of Farmers' Response to Price (Baltimore: The Johns Hopkins Press, 1958). Also, Vahid Nowshirvani, Agricultural Supply in India: Some Theoretical and Empirical Studies (M.I.T. Ph.D. Dissertation, Feb. 1968) and Jere Behrman, Supply Response in Underdeveloped Agriculture: A Case Study of Four Major Annual Crops in Thailand, 1937-1963 (M.I.T. Ph.D. Dissertation, Sept. 1966). The Behrman dissertation includes a bibliography of other supply studies, particularly in underdeveloped agriculture. The model has been employed in historical situations, particularly in Franklin M. Fisher and Peter Temin, "Regional Specialization and the Supply of Wheat in the United States, 1867-1914," Review of Economics and Statistics, LII, No. 2 (May, 1970). The work here follows Fisher and Temin closely, both in theoretical approach and in statistical technique.

[2] See note (a) to the table of the main results, concerning why these statistics are referred to as "quasi-t-statistics."

[3] Fisher and Temin, "Regional Specialization and the Supply of Wheat...," 138.

[4] Ibid., 140-1.

[5] Ibid.

[6] J.P. Cooper, "Asymptotic Covariance Matrix of Procedures for Linear Regression in the Presence of First Order Serially Correlated Disturbances," (forthcoming) Econometrica, Vol. 40.

[7] The contents of J.P. Cooper's article are included in the ESP Econometric Software Package Algorithm Manual (Cambridge, Mass.: M.I.T. Information Processing Center, Xeroxed, April 1, 1970).

[8] H. Gregg Lewis, "On the Distribution of the Partial Elasticity Coefficient," Journal of the American Statistical Association, Vol. 36, No. 215 (Sept. 1941), 413-6.

[9] Fisher and Temin, "Regional Specialization and the Supply of Wheat...," 134-49. The table that follows reproduces the Fisher and Temin results from their model which is identical in form to (7-16). It appears in "Regional Specialization..." on pp. 142-3. Fisher and Temin's notation has been modified to conform to the notation of this chapter.

In the tables, the numbers in square brackets underneath the parameter estimates are the quasi-t-statistics, not the standard errors. Also, the sample for the Dakotas runs from 1882 to 1914, and for California, from 1868 to 1914, because appropriate time series exist for those states only for those periods.

[10] See Appendix 7, Section (5).

APPENDIX 1

THE ESTIMATION TECHNIQUE

The proof of consistency and unbiasedness of the least squares estimates of the production function parameters is exactly parallel to that of Zellner, Kmenta, and Drèze [1]. First suppose u_{oi} is normally distributed with mean 0 and variance σ_{oo}^2. Then

$$E(e^{u_{oi}}) = \int_{-\infty}^{\infty} e^{u_{oi}} \frac{1}{\sigma_{oo}\sqrt{2\pi}} e^{-u_{oi}^2/2\sigma_{oo}^2} du_{oi}$$

$$= \int_{-\infty}^{\infty} \frac{1}{\sigma_{oo}\sqrt{2\pi}} e^{\frac{-u_{oi}^2}{2\sigma_{oo}^2} + u_{oi} - \frac{\sigma_{oo}^2}{2}} e^{\frac{\sigma_{oo}^2}{2}} du_{oi}$$

$$= e^{\frac{\sigma_{oo}^2}{2}} \int_{-\infty}^{\infty} \frac{1}{\sigma_{oo}\sqrt{2\pi}} e^{-(u_{oi}-\sigma_{oo}^2)^2/2\sigma_{oo}^2} du_{oi}$$

$$= e^{\frac{\sigma_{oo}^2}{2}}$$

Now for the i'th producing unit:

$$Q_i = A l_i^{\alpha} h_i^{\beta} k_i^{\gamma} e^{u_{oi}}$$

so that writing a superscript + to indicate expected values:

$$Q_i^{+} = E(Q_i) = A l_i^{\alpha} h_i^{\beta} k_i^{\gamma} e^{\frac{1}{2}\sigma_{oo}^2}$$

$$Q_i^{+} = Q_i e^{\frac{1}{2}\sigma_{oo}^2 - u_{oi}}$$

Since it has already been proved that the form of tenure makes no difference in this system, the first-order conditions are the ordinary ones for Cobb-Douglas production functions, except that the variables with random disturbance components are all replaced by their expected values. Thus:

$$\frac{Q_i^+}{l_i} = w_i^+, \text{ or } \log \alpha + \log Q_i - \log l_i + \tfrac{1}{2}\sigma_{oo}^2 - u_{oi} = \log w_i^+$$

$$\frac{Q_i^+}{h_i} = p_i^+, \text{ or } \log \beta + \log Q_i - \log h_i + \tfrac{1}{2}\sigma_{oo}^2 - u_{oi} = \log p_i^+$$

$$\frac{Q_i^+}{k_i} = v_i^+, \text{ or } \log \gamma + \log Q_i - \log k_i + \tfrac{1}{2}\sigma_{oo}^2 - u_{oi} = \log v_i^+$$

In each of these three equations let the deviation of expected prices from actual prices be given by a disturbance u_{ji}^+ $(j = 1,2,3)$, and the deviations from profit maximization due to managerial inertia or error be given by u_{ji}^* $(j = 1,2,3)$. Define $u_{ji} = u_{ji}^+ + u_{ji}^*$. Then if w, p, and v are the prevailing competitive prices of labor, land and capital:

$$\log Q_i - \log l_i - u_{oi} = \log\left(\frac{w}{\alpha}\right) - \tfrac{1}{2}\sigma_{oo}^2 + u_{1i}$$

$$\log Q_i - \log h_i - u_{oi} = \log\left(\frac{p}{\beta}\right) - \tfrac{1}{2}\sigma_{oo}^2 + u_{2i}$$

$$\log Q_i - \log k_i - u_{oi} = \log\left(\frac{v}{\gamma}\right) - \tfrac{1}{2}\sigma_{oo}^2 + u_{3i}$$

However:

$$\log Q_i = \log A + \alpha \log l_i + \beta \log h_i + \gamma \log k_i + u_{oi}$$

Substituting this into each of the three previous expressions:

$$\log A+\alpha \log l_i+\beta \log h_i+\gamma \log k_i+u_{oi}-\log l_i-u_{oi}=\log \frac{w}{\alpha}\quad \tfrac{1}{2}\sigma_{oo}^2+u_{1i}$$

$$\log A+\alpha \log l_i+\beta \log h_i+\gamma \log k_i+u_{oi}-\log h_i-u_{oi}=\log \frac{p}{\beta}\quad -\tfrac{1}{2}\sigma_{oo}^2+u_{2i}$$

$$\log A+\alpha \log l_i+\beta \log h_i+\gamma \log k_i+u_{oi}-\log k_i-u_{oi}=\log \frac{v}{\gamma}\quad -\tfrac{1}{2}\sigma_{oo}^2+u_{3i}$$

The u_{oi} terms add out on the left side of each of these equations; hence if the u_{ji} are independent of the u_{oi}, the optimal factor inputs will also be independent of the production function disturbance u_{oi}, and ordinary least squares applied to

$$\log Q_i=\log A+\alpha \log l_i+\beta \log h_i+\gamma \log k_i+u_{oi}$$

will yield consistent and unbiased estimates of the parameters of the production function [2].

NOTES TO APPENDIX 1

[1] A. Zellner, J. Kmenta, and J. Drèze, "Specification and Estimation of Cobb-Douglas Production Function Models," Econometrica, Vol. 34, No. 4 (October, 1966), 784-5.

[2] Ibid., 790-1.

APPENDIX 2

AGGREGATION

The proof that production functions of the type used in the text may be aggregated, with the input aggregates the natural sums of the inputs on the individual farms, parallels a similar proof first given by Solow [1]. County-wide aggregate production functions must exist if the county cross-section data are to be used in estimating the parameters of the function. Since each county is specified to belong to one and only one physical soil type category, the constant terms may be assumed to be the same for each farm in the county. Let F be any constant returns production function, with

$$Q_i = F(L_i, T_i, K_i) \quad \text{for farm } i,$$

$$L_i = a W_i + b B_i$$

$$T_i = c H_i + d J_i$$

and

W_i = white labor input on farm i,

B_i = black labor input

H_i = cotton land input

J_i = other improved land input

K_i = agricultural capital input.

The parameters a,b,c, and d represent the productivity levels of the respective inputs. This is the type of production function specified in Chapter IV, except that the aggregation proof holds for any constant returns function with inputs of this form--not only for Cobb-Douglas functions.

If the function is well-behaved, efficiency requires marginal product factor pricing, and competition equalizes the factor prices within the county:

$$\frac{\partial Q_i}{\partial W_i} = aF_1(L_i,T_i,K_i) = \frac{\partial Q_j}{\partial W_j} = aF_1(L_j,T_j,K_j) \qquad \text{all } i,j$$

$$\frac{\partial Q_i}{\partial H_i} = cF_2(L_i,T_i,K_i) = \frac{\partial Q_j}{\partial H_j} = cF_2(L_j,T_j,K_j) \qquad \text{all } i,j$$

$$\frac{\partial Q_i}{\partial K_i} = F_3(L_i,T_i,K_i) = \frac{\partial Q_j}{\partial K_j} = F_3(L_j,T_j,K_j) \qquad \text{all } i,j$$

Since F is constant returns, these equations imply the equality of the generalized factor ratios across farms [2]:

$$\frac{aW_i + b\,B_i}{cH_i + dJ_i} = \frac{aW_j + b\,B_j}{cH_j + d\,J_j}\,; \qquad \frac{K_i}{cH_i + d\,J_i} = \frac{K_j}{cH_j + d\,J_j}$$

and

$$\frac{aW_i + b\,B_i}{K_i} = \frac{aW_j + b\,B_j}{K_j}\,; \qquad \text{all } i,j \text{ within a given county.}$$

Let

$$a\,\Sigma W_i + b\,\Sigma B_i = L$$

$$c\,\Sigma H_i + d\,\Sigma J_i = T$$

$$\Sigma K_i = K$$

where the summation runs over all the farms in the county. Further define

$$\lambda_i = \frac{aW_i + b\,B_i}{L}\,; \qquad \mu_i = \frac{cH_i + d\,J_i}{T}\,; \qquad \eta_i = \frac{K_i}{K}$$

Applying the "adding up" rule for proportions:

$$\frac{\Sigma(aW_i + b B_i)}{\Sigma(cH_i + d J_i)} = \frac{aW_i + b B_i}{cH_i + d J_i} \qquad \text{or} \quad \lambda_i = \mu_i$$

Similarly $\lambda_i = \eta_i$. Now:

$$aW_i + b B_i = \lambda_i L, \quad cH_i + d J_j = \mu_i T \quad \text{and} \quad K_i = \eta_i K$$

Thus:

$$Q = \Sigma Q_i = \Sigma F(\lambda_i L, \mu_i T, \eta_i K)$$

$$= \Sigma F(\lambda_i L, \lambda_i T, \lambda_i K)$$

$$= \Sigma \lambda_i F(L, T, K) \qquad \text{(because of constant returns)}$$

$$= F(L, T, K)\Sigma \lambda_i$$

$$= F(L, T, K) \quad \text{since} \quad \Sigma \lambda_i = 1$$

Hence the aggregate production function exists, and the input aggregates are the "natural" sums of the farm inputs.

NOTES TO APPENDIX 2

[1] Robert M. Solow, "Capital, Labor, and Income in Manufacturing," in National Bureau of Economic Research Conference on Research in Income and Wealth, The Behavior of Income Shares, Studies in Income and Wealth, 27 (Princeton: Princeton University Press, 1964), 104-5.

[2] See Chapter III, Note 10.

APPENDIX 3

THE DATA

A. The data for the production function estimates

The county cross-sections of values of each of the variables were taken from the published Censuses of 1880, 1890, 1900 and 1910 [1]. The Census definitions of each of these variables, their units of measurement, and the Census sources of the cross-sections are listed in the following table. The volume numbers of the sources for each variable in each year refer to volumes of the Census for that year.

Census Definition, Units, and Source -- 1880

Variable	
Q	"Estimated value of all farm productions (sold, consumed, or on hand), 1889," in dollars, Vol. III: Agriculture..., Table VII.
W	Total white rural population = Total white population - white population of cities and towns of 4000 inhabitants and upwards. Total white population, in number of people, Vol. I: Population..., Table V. White population of cities and towns of 4000 inhabitants and upwards, in number of people, Vol I: Population..., Table VI.
B	Total black rural population = Total black population - black population of cities and towns of 4000 inhabitants and upwards. The sources of these variables are the same as for the variables used in computing W.
R	$R = W + B$
H	Acres in Cotton, 1879, Vol. III: Agriculture..., Table XIII.
T	"Total improved land in farms," in acres, Vol. III, Agriculture..., Table VII.
J	$J = T - H$
K	"Value of farming implements and machinery," in dollars, Vol. III, Agriculture..., Table VII.
S_i	Soil type dummy variables, Vol. V-VI, Report on Cotton Production..., Table I (for each state's report).

Census Definition, Units, and Source -- 1890

Variable	
Q	"Estimated value of farm products, 1889," in dollars, Vol. V: Agriculture..., Table 6.
W	Total white rural population = total white population - white population of places of 2500 inhabitants or more. Total white population, in number of people, Vol. I: Population..., Table 15. White population of places of 2500 inhabitants or more, number of people, Compendium..., Part I, Table 17.
B	Same as for W, with blacks instead of whites.
R	$R = W + B$
H	Cotton acres, 1889, Vol. V: Agriculture..., Table 16.
T	"Improved acres in farms," Vol. V: Agriculture..., Table 6.
J	$J = T - H$
K	"Valuation: Implements and Machinery," in dollars, Vol. V: Agriculture..., Table 6.
S_i	Soil type dummy variables, same as 1880.

Census Definition, Units, and Source -- 1900

Variable	
Q	"Value of Products not fed to livestock, [1899]," in dollars, Vol. V: Agriculture..., Table 19.
W	Total white population = total white population - white population for places having 2500 inhabitants or more. Total white population, in number of people, Vol. I: Population..., Table 19. White population for places having 2500 inhabitants or more, in number of people, Vol. I: Population..., Table 23.
B	Same as for W, with blacks instead of whites.
R	$R = W + B$
H	Cotton acres, 1899, and sea island cotton acres, 1899, both from Vol. VI: Agriculture..., Table 10.
T	"Improved acres in farms," Vol. V: Agriculture..., Table 19.
J	$J = T - H$
K	"Value of farm property: Implements and Machinery," in dollars, Vol. V: Agriculture..., Table 19.
S_i	Soil type dummy variables, same as 1880.

Census Definition, Units, and Source -- 1910

Variable

Q "Total value of all crops, 1909," in dollars, Vol. VI-VII: Agriculture..., Table 4 (for each state).

W Total white population, in number of people, Vol. II-III: Population..., Table I (for each state).

B Same as for W, with blacks instead of whites.

R Rural population = Total county population - population of places of 2500 or more, Vol. II-III: Population..., Table I (for each state).

Note that the proportion of blacks in this census year is computed as $B/(W+B)$, not as B/R, as in the previous years.

H Cotton acres, 1909, Vol. VI-VII: Agriculture..., Table 4 (for each state).

T "Improved land in farms," in acres, Vol. VI-VII: Agriculture..., Table 1 (for each state).

J $J = T - H$

K Value of implements and machinery, in dollars, Vol. VI-VII: Agriculture..., Table 1 (for each state).

S_i Soil type dummy variables, same as 1880.

Great problems are attendant on any use of Census data, even though such data are the best and most extensive quantitative record of agriculture for the period. The first difficulty with the census cross-sections is that not all variables are measured at the same point in time. For example, the output variable Q is an estimated value of output in the year prior to the enumeration. Since the actual enumeration was scheduled before all the census year's crops had been harvested, estimated output of the previous year was the best measure of production which could be obtained. Similarly the acreages planted to cotton and to all the other crops separately tabled, as well as value of fertilizers applied, are all estimated values for the year prior to the census year. On the other hand the input variables of population, total improved acres, and capital stock were all measured directly by the census-takers in the years of the censuses. Thus an error is introduced by the timing discrepancy. There is no way around this difficulty. Even so, the various input and output variables probably did not change too drastically from one year to the next, so that the error in measurement incurred by using the XXX9 value of output or cotton acreage as a proxy for the (unobserved) XXX0 census year values will not be too great.

A second difficulty with the output variable is that it is not identically defined in the four census years, particularly with regard to its treatment of the value of animal products produced on the farm. In commenting on the inadequacies of this recorded output to measure real farm income accurately, the Superintendent of the 1880 Census observed that the returns from both 1870 and 1880 were likely to be on

the conservative side because (1) the products were valued at the farm, farm, not in the market; (2) "double counting was avoided by excluding the value of products fed to livestock [actually this is a virtue rather than a drawback of the data], (3) the farmers were indisposed to report the value of the products they consumed on the farm, and (4) farmers tended to underestimate the value of their output out of fear of taxation"[2]. The 1890 Census used the same form of inquiry relating to the value of farm products as the tenth Census. These values were also undoubtedly underestimated, since for the U.S. as a whole the reported values of the "six cereals, with hay and cotton, had a farm value in excess of that total [of all farm products] and ... it, therefore, was deficient to an amount in excess of the value of all animals sold, and animals slaughtered on the farms, and of all miscellaneous products of the farm" [3]. Of course this does not mean that the six cereals and hay and cotton were meticulously reported and the value of animal products systematically omitted, although for the reasons given, the degree of under-reporting of livestock products was probably greater than for the major crops.

Recognizing these difficulties, the compilers of the Twelfth Census (1900) "made an effort to obtain, if possible, a more complete statement of the value of farm products. To secure such a statement, the farmers and enumerators were requested to state the value of all the important staple crops raised on farms, that of all animals sold, and animals slaughtered on farms, that of the poultry raised, and that of the various products not otherwise reported." While "the values of the great staple

crops, as cereals, cotton, and hay, were obtained with a comparatively narrow margin of error," the compilers of this Census still felt that miscellaneous products and livestock sale and slaughter were underestimated. Nevertheless: "The aggregate of such omissions is believed to be not less than 5 nor more than 10 percent of the total reported value of farm products" [4]. In the 1910 Census, the aggregate value of all farm products was not collected. The 1910 Census supervisors apparently despaired of being able to measure livestock output accurately:

> It is impossible to give a total representing the value of the annual production of all live stock products, for the reason that the total value of products of the business of raising domestic animals can not be calculated from the census returns. Even if a total representing the value of the annual production of live stock products could be obtained and were added to the value of all crops, the sum would not accurately represent the total value of farm products for the year, because much duplication would result from the fact that part of the crops are fed to the live stock [5].

In using the total value of all crops as the output variable in this year, the double counting of adding the value of crops fed to livestock to the value of livestock sold, consumed, or added to is again avoided, but at the cost of underestimating the contribution of the livestock to total production.

To summarize: for each Census the output variable tends to underestimate total agricultural output. The most persistent systematic underestimation is probably of the contribution of livestock to output, due to exclusion of "betterments and additions to stock" for 1880-1900 and to using the value of crops fed to livestock in 1910 to approximate the total value of livestock products.

The labor inputs consist of total black and white rural populations. The difficulty here is in distinguishing the agricultural labor force from the rural population. First of all, counties containing a city in which either the black or white population of the city exceeded 10,000 were excluded from the sample altogether. This was done to avoid contamination of the sample of rural counties by inclusion of the counties containing cities such as Atlanta, New Orleans, etc. In addition, in 1880 the inhabitants of all cities with populations greater than 4000 were deducted from the county populations to arrive at the rural population figure; in 1890 and 1900 the inhabitants of all cities with total populations greater than 2500 were deduced; in 1910 the rural population was reported directly. The 1910 rural population is directly comparable with the 1890 and 1900 definitions, since the Census definition of rural population excludes inhabitants of places of 2500 or more people [6]. Of course this procedure is open to two sources of error. First, by deducting the town dwellers from the total rural population, agricultural workers who lived in the towns but worked regularly in the surrounding fields were omitted, as well as some seasonal agricultural workers who lived in the towns and who performed agricultural labor only at peak periods. Counteracting this undercounting of agricultural laborers, the procedure employed includes in the agricultural labor force the inhabitants of the smaller towns and villages who were employed full-time in activities other than agriculture.

As well as not attempting to assess the relative participation of town and city dwellers in agriculture, no adjustment was made for the

difference between total population and working population. In other words, the same participation rate was assumed for the white and black populations, and no correction was made for age structure differences. It was simply assumed that total rural population was a proxy measure for the total agricultural labor force of each race.

The acreage variables are the reported acres in cotton, and total improved acres in farms. The Census definition of "improved acres" corresponds most closely of any of the Census land variables to the land input to total agricultural production:

> Improved Land includes all land regularly tilled or mowed, land in pasture which has been cleared or tilled, land lying fallow, land in gardens, orchards, vineyards, and nurseries, and land occupied by farm buildings....Substantially the same classification of farm land has been employed at the different censuses beginning with 1880, except that in 1890 and 1900 no distinction was made between woodland and other unimproved land [7].

Using total land in farms as the agricultural land input would include some lands that made little, if any, contribution to output (i.e., it would include lands which were claimed, but not worked at all), while any land input more restricted than total improved acres might exclude some pasturage or other land which did contribute to total output. The inclusion of land lying fallow in the improved-acres category probably introduces some error into this variable as a measure of land input to production, however.

When acres devoted to sea-island cotton and uplands cotton were reported separately, the total cotton acreage figure was obtained by simply adding the two cotton acreages. This ignores any difference between the quality or land requirements of the two types of cotton.

The agricultural capital variables used in all four Census years was the "value of implements and machinery" total reported for each county. Obviously implements and machinery were not the only component of agricultural capital. Farm animals were a vital part of the total capital stock, and fertilizers were also used. Nevertheless the value of implements and machinery was chosen as the single measure of farm capital. Land, labor and the possible capital measures were highly correlated with each other. In test regressions this collinearity was manifested in erratic behavior of the coefficient of total number of draft animals when that variable was included in regressions containing the other inputs. The coefficient of the draft animals (horses and mules) variable was often negative, and seldom was it large compared to its standard error. Similarly, no substantial improvement in fit was obtained when both the value of fertilizers and the value of implements and machinery were included in the regressions. No clear superiority in performance between value of fertilizers and value of implements and machinery emerged. In addition, many counties utilized no fertilizer at all, and the form of the production function is such that output is zero if the capital input is zero. Hence either the production function would have to be respecified or the counties not using fertilizer omitted from the sample, if fertilizer were used to measure capital or entered the production function as another input.

For these reasons it was decided to use the value of implements and machinery as the sole measure of agricultural capital input. Given the high degree of collinearity between the potential candidates for

measuring this variable, as well as the difficulty of many counties' not using any fertilizer, this choice of a capital measure is probably no great source of error in the estimates.

Finally, the soil types are those of the 1880 Survey of Cotton Production, edited by Eugene W. Hilgard. This 1880 survey classified each county of the South as belonging to one of twenty-eight soil categories [8]. Each state contained from 4 to 12 of these different types of soil. Since the sample for each estimate of the production function consisted of a particular state in a particular census year, dummy variables for each state were defined on the basis only of the soil types in each state. The definitions of the soil types corresponding to the dummy variables for each state are as follows [7]:

Alabama:

S1 - Metamorphic Region
S2 - Coosa Valley Region
S3 - Coal-Measures Region
S4 - Tennessee Valley Region
S5 - Oak and Hickory Uplands, with Short-Leaf Pine
S6 - Gravelly Hills, with Long-Leaf Pine
S7 - Oak and Hickory Uplands, with Long-Leaf Pine
S8 - Central Prairie Region
S9 - Long-Leaf Pine Region

Arkansas:

S1 - Alluvial Region, Mississippi Bottom Lands
S2 - Alluvial Region, Crowley's Ridge
S3 - Gray Silt Prairie Region
S4 - Yellow Loam Region
S5 - Red Loam Region
S6 - Northern Barrens and Hills

Florida:

S1 - Oak, Hickory and Pine Upland Region
S2 - Long-Leaf Pine Region, Short Staple Cotton
S3 - Long-Leaf Pine Region, Sea Island Cotton
S4 - Pitch-Pine, Treeless and Alluvial Region, Sea Island Cotton

Georgia:

S1 - Northwest Georgia
S2 - Metamorphic Region, Blue Ridge Counties
S3 - Metamorphic Region, Middle Georgia Counties
S4 - Central Cotton Belt
S5 - Southern Oak, Hickory, and Pine Uplands
S6 - Long-Leaf Pine and Wire-Grass Region, Limesink Division
S7 - Long-Leaf Pine and Wire-Grass Region, Pine Barrens Division
S8 - Pine Flats and Coast Counties

Louisiana:

S1 - Alluvial Region, North of Red River
S2 - Alluvial Region, South of Red River
S3 - Tide-Water Parishes
S4 - Bluff Region
S5 - Attakapas Region
S6 - Long-Leaf Pine Region
S7 - Oak Uplands

Mississippi:

S1 - Northeastern Prairie Region, Prairie Belt
S2 - Northeastern Prairie Region, Pontotoc Ridge
S3 - Yellow Loam Region, Brown Loam Table Lands
S4 - Yellow Loam Region, Short-Leaf Pine and Oak Upland Region
S5 - Cane Hills
S6 - Mississippi Alluvial Region
S7 - Central Prairie Region
S8 - Long-Leaf Pine and Coast Region, Long-Leaf Pine, Oak and Hickory Uplands
S9 - Long-Leaf Pine and Coast Region, Long-Leaf Pine Hills and Flats

North Carolina:

S1 - Seaboard Region
S2 - Long-Leaf Pine Region
S3 - Oak Uplands Region
S4 - Transmontane Region

South Carolina: [See note below]

S1 - Long-Leaf Pine Flats and Savannahs
S2 - Marshes, Swamps and Live-Oak Lands
S3 - Oak, Hickory and Long-Leaf Pine Hills
S4 - Sand Hills Belt
S5 - Granite and Metamorphic Gray and Red Lands of the Piedmont

Tennessee:

S1 - Alluvial Plain of the Mississippi River
S2 - Alluvial Plain of the Mississippi River and Plateau Slope of West Tennessee, Alluvial Plain and Bluff
S3 - Alluvial Plain of the Mississippi River and Plateau Slope of West Tennessee, Brown Loam Table Lands, Midland Counties
S4 - Alluvial Plain of the Mississippi River and Plateau Slope of West Tennessee, Summit Region of Watershed
S5 - Western Valley of Tennessee River
S6 - The Highlands, or Highland Rim of Middle Tennessee, Western Subdivision
S7 - The Highlands, or Highland Rim of Middle Tennessee, Eastern Subdivision
S8 - Central Basin
S9 - Cumberland Table Land
S10- Cumberland Table Land, Valley of East Tennessee, and Unaka Mountain Region, Table Land and Valley
S11- Cumberland Table Land, Valley of East Tennessee, and Unaka Mountain Region, Valley
S12- Cumberland Table Land, Valley of East Tennessee, and Unaka Mountain Region, Valley and Unaka

Texas:

S1 - Oak, Hickory and Pine Uplands
S2 - Long-Leaf Pine Region
S3 - Southern and Coast Prairie Region, Region East of the Brazos River
S4 - Southern and Coast Prairie Region, Region West of the Brazos River
S5 - Central Black Prairie Region
S6 - Western Red Loam Prairie Region
S7 - Red River Alluvial Counties
S8 - Brazos Alluvial or "Sugar Bowl" Region
S9 - Rio Grande Valley
S10 - Non-cotton Producing Counties [not a physical soil type]
S11 - Unorganized Counties [not a soil type]

The counties belonging in each classification were taken directly from the state tables in 1880 Survey, with the exception of South Carolina. For some reason no soil categorization table appeared for South Carolina in the copy of the Census used, so the South Carolina soil types and county groupings were taken from the reproduction of the Hilgard classifications in Sutch and Ransom's "Economic Regions of the South" [10].

It would have been preferable to assign counties to more than one soil type category in accordance with the proportions of their farm areas belonging to the different soil classifications. This was not done because it would have required geometric measurements from the soil type maps of each state to determine the relative proportions, and even this would not guarantee that the farmlands were divided in proportions equal to the division of total land area. Some lands were economically useless swamps, mountains, or forested areas.

No comparable survey of soil types exists for the subsequent three Censuses. For these years it was assumed that a county's soil type was the same as it had been in 1880. Since the soil type classifications were based on chemical and geographical analyses, it is unlikely that these characteristics changed much over the 40-year period. Counties created after 1880 present a different problem. The 1910 Census includes a list of all county boundary changes which took place after 1880 [11]. Using this list it is possible to determine the counties from which new counties were created. Suppose the new county was created out of pieces of n old counties. If a plurality of these old counties was of a particular soil type, the new county was classified as belonging to that soil type

category. If there was no such plurality the new county was arbitrarily assigned to one of the soil type categories which the old counties belonged to. There were relatively few such cases. It would have been better to assign the newly-created counties according to the preponderance of area of each type of soil, but this would have required use of detailed boundary-change maps, and it was felt not to be worth the data-collecting effort that would have been involved to obtain such maps. As can be seen from the results, these simplifications of the soil type classifications do not vitiate the usefulness of the Hilgard categories.

B. Data for the supply function estimates

In order to estimate cotton supply functions, for each Southern state, of the type proposed in Chapter VII, two basic sets of data are required. The first is a yearly time series of measurements of the acreages in the various crops. The second is a comparable time series of prices paid to producers for their crops. The time span 1882-1914 chosen for the sample was based on the availability of the data and to correspond as closely as possible to the years covered by the production function estimates.

The period 1882-1914 is of sufficient length to permit statistically meaningful estimation of the supply function. 1914 was taken as the end point to eliminate disturbances in price and/or structure induced by World War I. The war may have disrupted Southern agriculture in many ways, such as by draining agricultural labor away from the farms into the army or by marking the beginning of the migration of blacks to the Northern

cities [12]. The sample could not begin earlier than 1882 because no state-by-state series of consecutive yearly cotton prices could be found prior to that year. (See below for source and definition of the price variables.)

The data on crop acreages harvested are the revised statistics of the United States Department of Agriculture [13]. When the dependent variable was the share of cotton acreage in total acreage of all crops, total acreage was computed as the sum of all crop acreages available in the USDA series, which consisted of cotton, corn, wheat, oats, tame hay, barley, rye, sweet potatoes, potatoes, tobacco, and buckwheat. The total crop acreages calculated in this way include most of the improved acres reported in the census:

Sum of Acres Harvested in Eleven Major Crops as Percent of Total Improved Land in Farms, 1890 [14].

State	%
North Carolina	68
South Carolina	76
Georgia	74
Florida	70
Tennessee	65
Alabama	77
Mississippi	72
Arkansas	73
Louisiana	59
Texas	40

The low figure for Louisiana reflects the exclusion of sugar from the sum of harvested acres; the low figure for Texas is probably due to the

inclusion of cleared grazing lands in the Census definition of improved acres [15].

The failure to include sugar in the Louisiana totals is probably the most serious weakness in the acreage data, since sugar was an important cash crop. A sugar-acreage series comparable to those for the other crops was not found. No attempt was made to consider cattle or other livestock as a possible alternative to cotton in the model, and this may lead to some distortions of the results. However, since corn was the main food for livestock this is probably not a serious omission except in Texas, where many cattle grazed on open range land.

The USDA series are of acreage harvested in each crop, while the supply function specification would indicate acres planted as the appropriate variable in farmers' decision-making. However, the difference between acres planted and acres harvested (abandonment) is in part a function of the same factors that influence supply (mainly the relevant price). The remainder of the abandonment error may be subsumed in the disturbance term, since it is a function of weather, pests and other unpredictable events. Some trial regressions were run using yield as a proxy for the weather factors leading to abandonment [16], but the yield coefficient was rarely significant, and did not display any intra-regional pattern. Hence yield was not included in the final specification, and the measurement error involved in using acres harvested rather than acres planted was treated as part of the disturbance.

The price data are crop prices paid to producers on December 1 [17]. They are not strictly prices at the farm gate:

> The prices reported to the Department of Agriculture are the prices at which the products first changed hands when sold by the producers, usually the price the farmer receives in his local market. For most farm products there is no price "at the farm"; the prices called such include the variable item of cost to the farmer of transporting the product to the place where it changes hands [18].

It is reasonable to suppose, however, that the farmers or other decision-makers (such as merchants who dictated crop choice) would have taken account of these local transportation costs in making their planting decisions, so this potential distortion of the "prices paid to producers" should have no bearing on the role of the price variables in the cotton supply functions.

The relative price appearing in the models is the price of cotton divided by an index of the prices of the major alternative crops. This index was constructed as a value-weighted index with 1890 as the base year. Defining Y_t as the index of the prices of the alternative crops:

$$Y_t = \sum_i \frac{P_t^i}{P_{1890}^i} w^i$$

where i = corn, wheat, oats and tame hay; and w^i = the proportion of value from all four of the major alternative crops due to the i'th crop in 1890. The procedure omits the crops other than cotton and the four in Y_t, but those five crops comprised the major part of the output of the eleven crops in the acreage series:

Percent of value of cotton, corn, wheat, oats and tame hay to total value of all eleven crops in the USDA acreage series, 1890.

State	%	
North Carolina	77	(tobacco = 17%)
South Carolina	91	
Georgia	95	
Florida	77	(sweet potatoes = 14%)
Tennessee	87	
Alabama	96	
Mississippi	97	
Arkansas	96	
Louisiana	96	(but sugar not included in the "total")
Texas	98	

The relative price variable used in the estimations was $P_t = P_t^{cotton}/Y_t$. While this variable is correlated between states, there is some degree of independent variation between states, as the following correlation matrix shows:

Correlation matrix of relative price variable between states, 1882-1914

	NC	SC	GA	FL	TE	AL	MI	AR	LA	TX
North Carolina	1.0	.96	.92	.48	.92	.94	.89	.88	.84	.82
South Carolina			.95	.58	.94	.97	.94	.90	.90	.89
Georgia				.64	.92	.93	.91	.89	.92	.87
Florida					.56	.59	.61	.55	.61	.56
Tennessee						.94	.92	.94	.88	.88
Alabama							.97	.94	.93	.93
Mississippi								.93	.95	.89
Arkansas									.91	.93
Louisiana										.88
Texas										1.0

Finally the proper dating of the observations must be followed. The acreage figures are given for the crop year. A crop year includes a full growing season; so, for example, crop year 1882 begins in 1882. Since the prices are December 1 prices, the P_{t-1} appearing with X_t in in (7-16) is the price given for the year prior to the year of X_t. Farmers making decisions about acreage allotments in 1883 based their decisions on the last available observed prices, those of December 1882. Alternatively the cotton planting for 1883 would be based on the expected price of cotton at the time of the harvest, which would be roughly the same as the December 1883 price.

NOTES TO APPENDIX 3

[1] The Census volumes which formed the basic data source for the production function estimates were the following:

U.S. Census Office, Tenth Census, 1880, Vol. I: Statistics of the Population of the United States (Washington: Government Printing Office, 1883); Vol. III: Report on the Production of Agriculture (Washington: Government Printing Office, 1883); Vol. V-VI: Report on Cotton Production in the United States; also Embracing Agricultural and Physico-geographical Descriptions of the Several Cotton States and of California, ed. by Eugene W. Hilgard (Washington: Government Printing Office, 1884).

U.S. Census Office, Eleventh Census, 1890, Vol. I: Report on Population of the United States (Washington: Government Printing Office, 1895-1897); Vol. V: Reports on the Statistics of Agriculture in the United States, Agriculture by Irrigation in the Western Part of the United States, and Statistics of Fisheries in the United States (Washington: Government Printing Office, 1895); Compendium of the Eleventh Census: 1890 (3 Pts., Washington: Government Printing Office, 1892-1897).

U.S. Census Office, Twelfth Census, 1900, Vol. I-II: Population (Washington: Government Printing Office, 1901-1902); Vol. V-VI: Agriculture (Washington: Government Printing Office, 1902).

U.S. Bureau of the Census, Thirteenth Census of the United States: 1910, Vol. II: Population, 1910. Reports by States, with Statistics for Counties, Cities and Other Civil Divisions -- Alabama-Montana (Washington: Government Printing Office, 1913); Vol. III: Population, 1910. Reports by States, with Statistics for Counties, Cities and Other Civil Divisions -- Nebraska-Wyoming, Alaska, Hawaii, and Porto Rico [sic] (Washington: Government Printing Office, 1913); Vol. V: Agriculture, 1909 and 1910. General Report and Analysis (Washington: Government Printing Office, 1913); Vol. VI: Agriculture, 1909 and 1910. Reports by States, with Statistics for Counties -- Alabama-Montana (Washington: Government Printing Office, 1913); Vol. VII: Agriculture, 1909 and 1910. Reports by States, with Statistics for Counties -- Nebraska-Wyoming, Alaska, Hawaii, and Porto Rico [sic] (Washington: Government Printing Office, 1913).

In subsequent references to the Census, only the number and year of the Census, and a shortened title of the volume of the Census (e.g., Agriculture..., Population..., etc.) along with the appropriate page or table reference will be given.

[2] Tenth Census, 1880, Vol. III: Agriculture..., xxv, cited in Twelfth Census, 1900, Vol. V: Agriculture...,cxx.

[3] Twelfth Census, 1900, Vol. V: Agriculture..., cxxi.

[4] Ibid., cxxi-cxxii.

[5] Thirteenth Census, 1910, Vol. V: Agriculture, General Report..., 473.

[6] Thirteenth Census, 1910, Vol. II-III: Population..., Table 2 contains for each state a list of the county locations of incorporated places, which proved invaluable in locating the towns of 2500 inhabitants or more (4000 or more in 1880) in their respective counties.

[7] U.S. Bureau of the Census, Fourteenth Census of the United States Taken in the Year 1920, Vol. V: Agriculture: General Report and Analytical Tables (Washington: Government Printing Office, 1922), 17.

[8] Richard C. Sutch and Roger L. Ransom, "Economic Regions of the South in 1880," Working Paper III of Southern Economic History Project Working Paper Series (Berkeley: Institute of Business and Economic Research, mimeographed, 1971), 12.

[9] Tenth Census, 1880, Vol. V-VI: Report on Cotton Production..., ed. by Eugene W. Hilgard, Table 1 (for each state). The smallest soil type divisions reported in these state tables are assignmed dummy variables, even when these sub-divisions are part of a more inclusive soil type (e.g., S1 and S2 in Arkansas, etc.).

[10] Sutch and Ransom, "Economic Regions of the South...," Table 2, 13-14; Table B-1, 64-68; Table B-2, 94.

[11] Thirteenth Census, 1910, Vol. II-III: Population..., Table V (for each state).

[12] Paul S. Taylor, "Slave to Freedman," Working Paper VII of the Southern Economic History Working Paper Series (Berkeley: Institute of Business and Economic Research, mimeographed, 1970).

[13] The sources for both acreage and yield data are as follows:

(i) Cotton: U.S. Department of Agriculture, Agricultural Marketing Service, Cotton and Cottonseed: Acreage, Yield, Production, Disposition, Price, Value, by States, 1866-1952, Statistical Bulletin No. 164 (Washington: Government Printing Office, 1955).

(ii) Wheat: U.S. Department of Agriculture, Agricultural Marketing Service, Wheat: Acreage, Yield, Production, by States, 1866-1943, Statistical Bulletin No. 158 (Washington: Government Printing Office, 1955).

(iii) Potatoes: U.S. Department of Agriculture, Bureau of Agricultural Economics, Potatoes: Acreage, Production, Value, Farm Disposition, Jan. 1 Stocks, 1866-1950, Statistical Bulletin No. 122 (Washington: Government Printing Office, 1953).

Acreage and yield data for the other crops were not found in any of the regular Department of Agriculture series such as the Statistical Bulletins or the Miscellaneous Bulletins. These acreages were instead found in mimeographed circulars printed by the U.S. Department of Agriculture, Bureau of Agricultural Economics, titled and dated as follows:

(iv) Revised Estimates of Barley Acreage, Yield and Production, 1866-1929 (February, 1935).

(v) Revised Estimates of Corn Acreage, Yield and Production, 1866-1929 (May, 1934).

(vi) Revised Estimates of Oats Acreage, Yield and Production, 1866-1929 (July, 1934).

(vii) Revised Estimates of Tobacco Acreage, Yield and Production, 1866-1929 (August, 1935).

(viii) Revised Estimates of Buckwheat Acreage, Yield and Production, 1866-1929 (August, 1936).

(ix) Revised Estimates of Tame Hay Acreage, Yield and Production, 1866-1929 (December, 1936).

(x) Revised Estimates of Rye Acreage, Yield and Production, 1866-1929 (October, 1935).

(xi) Revised Estimates of Sweet Potatoes Acreage, Yield and Production, 1866-1929 (February, 1937).

These bulletins and circulars will subsequently be referred to as USDA Revised Estimates... .

[14] The state totals of improved acres in 1890 were taken from U.S. Census Bureau, Abstract of the Fourteenth Census of the United States, 1920 (Washington: Government Printing Office, 1923), 595-7.

[15] See Note 7 above.

[16] Following Geoffrey Moore's suggestion to Fisher and Temin, "Regional Specialization and the Supply of Wheat...," 138.

[17] The source for all the price series was U.S. Department of Agriculture, Prices of Farm Products Received by Producers, 3. South Atlantic and South Central States, Statistical Bulletin No. 16 (Washington: Government Printing Office, 1927).

[18] Ibid., 2.

APPENDIX 4

A SAMPLE OF DIRECT OBSERVATIONS ON THE DIVISION OF SHARES BETWEEN THE FACTORS OF PRODUCTION

For each observation the source, terms of contract (when known) and share of output received by the sharecropper are given. The sample includes all instances of observations on the division of the crop in sharecropping arrangements that were found in the course of the research. It is extensive, but not exhaustive by any means.

	Source	Terms of Contract	Share to Laborer
1.	John Caldwell Calhoun, testimony, in Timothy Thomas Fortune, Black and White: Land Labor and Politics in the South (New York: Fords, Howard & Hulbert, 1884; Reprinted by Arno Press and the New York Times, New York, 1960), 246.	"The proprietor furnishes the land and houses, including dwelling, stables and outhouses, pays the taxes, makes all necessary improvements, keeps up repairs and insurance, gives free of cost a garden spot, fuel, pasturage for the stock owned by the laborers, and allows the use of his teams for hauling fuel and family supplies, provides mules or horses, wagons, gears, implements, feed for teams, the necessary machinery for ginning, or, in short, every expense of making the crop and preparing it for market..."	1/2
2.	Ibid., 247.	"[Under renting] when the laborer owns his own teams, gears, and implements necessary for making a crop...."	2/3 or 3/4, depending on the fertility of the land.
3.	Robert Somers, Southern States Since the War, 1870-71 (London and New York: Macmillan and Co., 1871), 146.	Not specified.	1/2
4.	A.R. Lightfoot, "Condition and Wants of the Cotton Raising States," DeBow's Review (Feb. 1869), 153.	Not specified. The given share value is the last value given by Lightfoot, and pertains to 1867.	1/2
5.	Frances Butler Leigh, Ten Years on a Georgia Plantation [1866], cited in Walter Fleming, Documentary History of Reconstruction, Vol. II (Cleveland: Arthur H. Clark Company, 1907), 300.	Not specified.	1/2

	Source	Terms of Contract	Share to Laborer
6.	Enoch Banks, The Economics of Land Tenure in Georgia, Studies in History, Economics and Public Law, Vol. XXIII, No. 1 (New York: Columbia University Press, 1905), 79	"The landlord furnishes land, house, livestock, farming implements and seed...." [sometimes 1/2 the seed]	1/2
7.	Ibid., 80	The landlord supplies only land and house; the tenant furnishes "all other forms of capital as well as the labor required in the production of the crop."	2/3 of grain, 3/4 of cotton.
8.	Vernon Wharton, The Negro in Mississippi, 1865-1890, Vol. 28 of The James Sprunt Studies in History and Political Science (Chapel Hill: University of North Carolina Press, 1947), 69-70. Wharton's sources are: U.S. Commissioner of Agriculture, Report, 1867, 417; and "Report of the Planters of Washington County," Appleton's Cyclopedia, 1879, p. 634.	a. Landlord supplies rations [plus everything else?]	a. 1/4
		b. Landlord does not supply rations.	b. 1/3
		c. Tenant also supplies half the feed for stock [plus rations].	c. 1/2
		a, b, and c apply to Greenville and Yazoo sections.	
		d. Laborer supplies only labor (neighborhood of Louisville).	d. 3/10
		e. Laborer supplies labor, rations and feed (Tippah County).	e. 1/2
9.	James B. Runnion, "The Negro Exodus," Atlantic Monthly, XLIV (Aug. 1879), 224.	Landlord supplies only "the use of the land, without stock, tools, or assistance of any kind."	1/2 to 3/4, perhaps averaging 2/3
10.	U.S. Industrial Commission, Reports of the Industrial Commission, Vol. XI: Report of the Industrial Commission on Agriculture and on the Taxation in the Various States (Washington: Government Printing Office, 1901), 135.	a. Varies, depending on laborer's "ability to furnish more than his muscle" [North Carolina]	a. 1/4 to 1/2
		b. Alabama: Laborer provides labor alone.	b. 1/3 of cotton, 1/4 of corn

Source	Terms of Contract	Share to Laborer
	c. Alabama: Laborer feeds himself and pays for half the fertilizer if any is used.	c. 1/2
	d. Tennessee: On [fertile] bottom lands, new or highly improved grounds, landlord furnishing nothing but soil.	d. 1/2
	e. Tennessee: Lands of average productivity and condition, landlord furnishing stock and seed.	e. 1/2
	f. Mississippi: Landlord furnishing team, laborer feeding himself and team.	f. 1/2
11. U.S. Industrial Commission, Reports of the Industrial Commission, Vol. X: Report of the Industrial Commission on Agriculture and Agricultural Labor (Washington: Government Printing Office, 1901), 918. Testimony of Hon. Robert Ransom Poole, Commissioner of Agriculture of the State of Alabama.	a. "The owner of the land furnishes the land and the tenant house and all the teams and implements necessary to make a crop. The tenant furnishes the labor."	a. 1/2 of cotton, 1/3 of corn and other crops.
	b. "Landowner or landlord furnishes everything, and furnishes the tenant so many provisions, say provisions for 6 months..."	b. 1/3
12. Benjamin Hibbard, "Tenancy in the Southern States," Quarterly Journal of Economics, XXVII, No. 3 (May 1913) 485-6.	a. Tenants who furnished little or nothing in the way of equipment.	a. 1/2
	b. Tenants who furnish a considerable part of the equipment, usually including one or two mules.	b. 2/3 or 3/4
13. Theodore Salutos, "Southern Agriculture and the Problems of Readjustment: 1865-1877," Agricultural History, Vol. 30, No. 2 (April 1956), 71. Salutos does not specifically footnote his generalizations. But he does cite D. Wyatt Aiken, "Agriculture in Mississippi," The Rural Carolinian, Vol. 1 (May 1870), 476, for 1870 Mississippi agriculture on "halves."	a. "The 'cropper' working on 'halves,' normally did all the work himself and generally furnished his own provisions. The owner, as his part of the bargain, furnished the land, a house, seed, plows, hoes, teams, wagons, ginned the cotton, and paid half the fertilizer bill...."	a. 1/2
	b. Landlord furnished everything but labor.	b. 1/4
	c. Landlord furnished everything except labor and provisions.	c. 1/3

Source	Terms of Contract	Share to Laborer
14. Marjorie S. Mendenhall, "The Rise of Southern Tenancy," Yale Review, Vol. 27, No. 1 (Autumn, 1937), 125, citing:		
a. "Report made upon the condition of the South to General Grant by Theodore C. Peters, the former President of the New York State Agricultural Society, includ[ing] a letter from a planter who was head of an agricultural club in South Carolina (1867)."	a. Tenants fed themselves, and paid for one-third of the commercial manures. "Apparently the landlord commonly furnished mules, forage, utensils, housing, and fuel together with six or eight acres gratis, to be cultivated by the tenant's wife and children."	a. 1/2 of the breadstuffs and 1/3 of the cotton lint.
b. Report of Federal Commissioner of Agriculture, based on information received from correspondents throughout the South (1867).	b. South Carolina, with labor furnishing its own rations.	b. 1/3
c. Harry Hammond(1866)	c. Landlord furnishing food and shelter.	c. 1/4
d. Harry Hammond (1869)	d. Not specified.	d. 1/2
e. Harry Hammond (later than 1869, but date not specified)	e. Not specified.	e. 3/4
15. Rosser H. Taylor, "Post-Bellum Southern Rental Contracts," Agricultural History, Vol. 17, No. 2 (April 1943), 121.	Not specified	1/3

The following observations on the division of shares are all taken from U.S. Census Office, Tenth Census, 1880, Vol. V-VI: Report on Cotton Production in the United States: Also Embracing Agricultural and Physico-geographical Descriptions of the Several Cotton States and of California, edited by Eugene W. Hilgard (Washington: Government Printing Office, 1884). For each state's survey, the information below is taken from the "Cultural and Economic Survey," sub-section titled "Labor and System of Farming." Each state survey is separately paginated, and these are the page numbers

indicated in parentheses just following the state names. The groups of names beneath the state name are the counties for which the particular description of contracts and shares applies.

Source	Terms of Contract	Share to Laborer
16. Alabama (p. 155)	a. Landlord furnishes everything but the laborers' board.	a. 1/2
	b. Landlord furnishes only land.	b. 3/4 of cotton, 2/3 of corn.
17. Arkansas (p. 105)		
a. Arkansas Craighead Cross Crittenden Desha Garland Pulaski Lee Mississippi Union Miller	a. Owner furnishes supplies and working implements (including one horse or mule for every 15-20 acres).	a. 1/2
b. Sevier Pope Columbia	b. Owner furnishes working implements and horse or mule; laborer furnishes supplies.	b. 1/2
c. Saint Frances Clark Conway Franklin	c. The tenant boards himself and provides the gin and press; the owner furnishes all other implements.	c. 1/2
d. Dallas White Woodruff	d. Owner supplies everything.	d. 1/2
e. same counties as in d.	e. Tenant provides all supplies and implements.	e. 3/4
f. Chicot Scott	f. Owner supplies everything but provisions.	f. 1/2
g. Grant Marion Faulkner Howard Crawford	g. Owner provides only land.	g. 2/3 or 3/4

Source	Terms of Contract	Share to Laborer
h. Same counties as in g.	h. Owner furnishes everything except gin and press.	h. 1/2
i. Sebastian Boone Fulton Baxter	i. Owner provides land and gin only.	i. 2/3
j. Jefferson	j. Owner furnishes everything but board...gardens are given to the negroes rent free.	j. 1/2
k. Hot Spring Prairie	k. Same as d, e and f [note the discrepancy - the terms in d, e and f are dissimilar].	k. Same as d, e and f, except 1/3 of corn is included in rent.
18. Florida (p. 70)	a. Landowner furnishes teams and implements.	a. 1/2
	b. Landowner furnishes teams, implements and all supplies.	b. 1/4 to 1/3
19. Georgia (p. 172)	a. Landlord provides land alone.	a. 3/4 of cotton and 2/3 of corn
	b. Landlord provides land, implements and teams; laborer boards himself.	b. 1/2
	c. Landlord provides land, implements, teams and board.	c. 1/3
d. Appling County	d. [See last column.]	d. Labor alone = 1/3 of crop. Land = 1/3 of crop. Stock, feed and implements = 1/3.
20. Louisiana (p. 83)	a. Owner furnishes land, teams and implements.	a. 1/2
	b. Owner furnishes land alone.	b. 3/4
	c. Owner furnishes land, implements and board.	c. 1/3

	Source	Terms of Contract	Share to Laborer
21.	Mississippi (p. 154)	a. Landowner furnishes land, implements and teams.	a. 1/2
		b. Landowner furnishes only land.	b. 2/3 to 3/4 of cotton; 2/3 of corn.
		c. Landowner furnishes board and everything else.	c. 1/4
22.	North Carolina (p.77)	a. Landowner furnishes all necessary supplies except food for the laborer, and one-half of any fertilizers that may be used.	a. 1/2
		b. Landowner furnishes land alone, without supplies.	b. 2/3 corn 3/4 cotton
23.	South Carolina (pp. 60-66)		
	a. Coast Region	a. Landowner provides house, fuel and 6 acres of arable land.	a. 2/3 of labor time (4 days/wk. for 10 mos).
	b. Lower Pine Belt	b. Landholder furnishes all supplies.	b. 2/3 cotton 1/2 provision crop
	c. Williamsburgh County (in b)	c. Landlord provides land alone.	c. 2/3 to 3/4
	d. Clarendon County (in b)	d. Landlord "advances" all supplies [Note: Unclear of what this is an observation].	d. 2/3 "net" of crop.
	e. Upper Pine Belt, Silverton Township	e. Landowner provides house, rations and three acres of land.	e. Slightly more than 1/4.
	f. Barnwell Hampton Darlington Marlborough (Counties)	f. Employer furnishes land, teams and implements.	f. 1/3 to 1/2
	g. Aiken County (of e)	g. Landlord provides everything but food.	g. 1/3
	h. Same as g.	h. Landlord provides everying including food.	h. 1/4

Source	Terms of Contract	Share to Laborer
i. Metamorphic Region: Laurens Chester Abbeville York portions of Fairfield & Spartanburgh	i. Landlord furnishes tools, stock and stock-feed.	i. 1/2
j. Metamorphic Region: Greenville portions of Fairfield & Spartanburgh	j. Same as i.	j. 1/3
k. Greenville	k. Landlord furnishes only land.	k. 2/3
l. Metamorphic Region	l. Landlord furnishes land alone.	l. 2/3 to 3/4
24. Tennessee (p. 104)	a. Owner furnishes land only.	a. 2/3 of crop, or 3/4 cotton & 2/3 corn.
	b. Owner furnishes also supplies, such as teams, implements, seed, etc.	b. 1/2
25. Texas (p. 161)	a. Owner furnishes implements, teams and feed; buildings and improvements are <u>generally</u> included in Texas farms.	a. 1/2
	b. Renter furnishes own supplies.	b. 3/4 cotton, 2/3 grain and other products.
	c. Owner provides board in addition to farm and implements.	c. 1/3

From this compilation it is clear that the share of output received in payment for labor services alone fluctuated between 1/4 and 1/2 of the crop. In order to condense the mass of references to a few figures, it is useful to calculate the unweighted average of all labor share values under roughly comparable conditions as to the factors supplied to the landlords. The observations listed under Category I below are those of the share of

output received for labor alone, as near as can be determined from the often-skimpy information provided on the terms of contract. In cases where the shares of the different crops were different, both numbers were included in the unweighted average. Similarly, Category II observations correspond as closely as possible to the shares received by the tenant when the landlord supplied only land. Again, when several shares are given for the same observation, all are included in the unweighted average. Given these average labor and land shares, and assuming constant returns and exhaustion of the product, the average capital share can be calculated as well. (It simply equals one minus the sum of the land and labor shares.)

The factor shares found from these direct observations, and the overall average competitive factor shares computed from the production function estimates, correspond rather closely:

Factor shares:	labor	land	capital
Direct Observation of Share Payments	.415	.311	.274
Group I Production Functions	.309	.396	.321
Group II Production Functions	.319	.387	.315

(See Chapters IV and V for full discussion of these results.)

Category I -- Laborer provides labor alone, with or without provisions, including or not some portion of cost of fertilizer, feed, seed, part or all of ginning.

Observation Number	Labor Share	Observation Number	Labor Share	Observation Number	Labor Share
1	1/2	14c	1/4	23e	1/4
6	1/2	16a	1/2	23f	1/3, 1/2
8a	1/4	17a	1/2	23g	1/3
8b	1/3	17b	1/2	23h	1/4
8c	1/2	17c	1/2	23i	1/2
8d	3/10	17d	1/2	23j	1/3
8e	1/2	17f	1/2	24b	1/2
10a	1/4, 1/2	17h	1/2	25a	1/2
10b	1/3, 1/4	17j	1/2	25c	1/3
10c	1/2	18a	1/2		
10e	1/2	18b	1/4, 1/3		
10f	1/2	19b	1/2		
11a	1/2, 1/3	19c	1/3		
11b	1/3	19d	1/3		
12a	1/2	20a	1/2		
13a	1/2	20c	1/3		
13b	1/4	21a	1/2		
13c	1/3	21c	1/4		
14a	1/2, 1/3	22a	1/2		
14b	1/3	23b	2/3, 1/2		

Unweighted Average = .415

Category II

Landlord provides land alone.

Observation Number	Tenant Share
7	2/3, 3/4
9	1/2, 3/4, 2/3
10d	1/2
12b	2/3, 3/4
16b	3/4, 2/3
17g	2/3, 3/4
17i	2/3
19a	3/4, 2/3
19d	2/3
20b	3/4
21b	2/3, 3/4, 2/3
22b	2/3, 3/4
23a	2/3
23c	2/3, 3/4
23k	2/3
23l	2/3, 3/4
24a	2/3, 3/4, 2/3
25b	3/4, 2/3

Unweighted average = .689

Average land share, assuming constant returns and exhaustion of the product = .311.

APPENDIX 5

THE DIFFERENCE IN MEANS OF H/T AND B/R IN COUNTIES RANKED BY OVER-ALL S_i COEFFICIENTS, WITH TEST OF SIGNIFICANCE

To begin with, the soil types were divided into the "best" and "rest" soils according to the over-all rank of the coefficients of the S_i. The ranks of each soil type were averaged over the four census years, with half of the soil types with the lowest over-all rank (hence highest fertility net of race- and crop-associated differences) grouped together as the "best" soils and the other half grouped as the "rest" of the soils in each state. Since the soil type categories do not all contain the same number of counties, there are usually different numbers of counties in the "best" and "rest" categories.

The results of this division are given in the following table. The "best" soil categories are ranked according to their coefficients from the Group I regressions in the left-hand column. The right-hand column of figures gives the corresponding ranking of each tabled soil type for the Group II regression coefficients (to be introduced subsequently in the text). It should be noted that even net of cotton- and race-associated fertility differences, the Mississippi River alluvial lands are the most fertile soils in the four states where they are present (Tennessee, Arkansas, Mississippi and Louisiana).

Listing of the "Best" Soils by State, Four-Census Averages,

in Order of Net Residual Fertility

State	Group I	Group II
North Carolina	S2 - Long-leaf pine region	(1)-(2) [tie]
	S3 - Oak uplands region	
	S4 - Transmontane region	(1)-(2)
South Carolina	S2 - Marshes, swamps and live-oak lands of the coast	(1)
	S3 - Oak, hickory and long-leaf pine hills in the Central Belt	(2)
Georgia	S7 - Long-leaf pine and wire-grass region, pine barrens division	(1)
	S8 - Pine flats and coast counties	(2)
	S6 - Long-leaf pine and wire-grass region, limesink division	(4)
	S4 - Central cotton belt	(3)
Florida	S4 - Pitch-pine, treeless and alluvial region, sea island cotton	(1)
	S3 - Long-leaf pine region, sea island cotton	(2)
Tennessee	S1 - Alluvial plain of the Mississippi River	(1)
	S2 - Alluvial plain of the Mississippi River and plateau slope of West Tennessee, alluvial plain and bluff	(2)
	S5 - Western valley of the Tennessee River	(3)
	S3 - Alluvial plain of the Mississippi River and plateau slope of West Tennessee, brown-loam table-lands, midland counties	(4)
	S4 - Alluvial plain of the Mississippi River and plateau slope of West Tennessee, summit region of watershed	(6)
	S6 - The Highlands, or highland rim of middle Tennessee, western subdivision	(5)

State	Group I	Group II
Alabama	S9 - Long-leaf pine region	(1)
	S7 - Oak and hickory uplands, with long-leaf pine	(3)
	S1 - Metamorphic region	(2)
	S5 - Oak and hickory uplands, with short-leaf pine	(4)
Mississippi	S6 - Mississippi alluvial region	(1)
	S9 - Long-leaf pine and coast region, long-leaf pine hills and flats	(2)
	S8 - Long-leaf pine and coast region, long-leaf pine, oak and hickory uplands	(4)
	S3 - Yellow loam region, brown loam table lands	(3)
Arkansas	S1 - Alluvial region, Mississippi bottom lands	(1)
	S2 - Alluvial region, Crowley's Ridge	(2)
	S6 - Northern barrens and hills	(3)
Louisiana	S2 - Alluvial region, south of Red River [= S3]	(1)-(2)
	S3 - Tide-water parishes	(1)-(2)
	S1 - Alluvial region, north of Red River	(3)
Texas	S2 - Long-leaf pine region	(1)
	S3 - Southern and coast prairie region, region east of the Brazos River [= S7]	(3)-(4)
	S7 - Red River alluvial counties	(2)
	S1 - Oak, hickory and pine uplands [= S10]	(3)-(4)
	S10- Non-cotton-producing counties	(5)

Listing of the "Rest" Soils by State, Four-Census Averages,

in Order of Net Residual Fertility

State	Group I	Group II
North Carolina	S4 - Transmontane region	
		S3 - Oak uplands region (3)
	S1 - Seaboard region	(4)
South Carolina	S1 - Long-leaf pine flats and savannahs	(3)
	S5 - Granite and metamorphic gray and red lands of the Piedmont	(4)
	S4 - Sand hills belt	(5)
Georgia	S5 - Southern oak, hickory and pine uplands	(5)
	S3 - Metamorphic region, middle Georgia counties	(6)
	S1 - Northwest Georgia	(7)
	S2 - Metamorphic region, Blue Ridge counties	(8)
Florida	S2 - Long-leaf pine region, short staple cotton	(3)
	S1 - Oak, hickory and pine upland region	(4)
Tennessee	S8 - Central basin	(7)
	S7 - The Highlands, or highland rim of middle Tennessee, eastern sub-division	(8)
	S12 - Cumberland table land, valley of East Tennessee, and Unaka Mountain region, valley and Unaka	(9)
	S10 - Cumberland table land, valley of East Tennessee, and Unaka Mountain region, table land and valley	(10)
	S9 - Cumberland table land	(11)
	S11 - Cumberland table land, valley of East Tennessee, and Unaka Mountain region, valley	(12)

State	Group I	Group II
Alabama	S6 - Gravelly hills, with long-leaf pine region	(5)
	S2 - Coosa valley region	(7)
	S8 - Central prairie region	(6)
	S4 - Tennessee valley region	(8)
	S3 - Coal-measures region	(9)
Mississippi	S7 - Central prairie region	(5)
	S4 - Yellow-loam region, short-leaf pine and oak upland region	(6)
	S5 - Cane hills	(7)
	S2 - Northeastern prairie region, Pontotoc ridge	(8)
	S1 - Northeastern prairie region, prairie belt	(9)
Arkansas	S3 - Gray silt prairie region	(6)
	S5 - Red loam region	(4)
	S4 - Yellow loam region	(5)
Louisiana	S6 - Long-leaf pine region	(4)
	S5 - Attakapas region	(5)
	S4 - Bluff region [= S7]	(6)-(7)
	S7 - Oak uplands	(6)-(7)
Texas	S8 - Brazos alluvial or "Sugar Bowl" region	(10)
	S9 - Rio Grande valley	(6)-(7)
	S6 - Western red-loam prairie region	(8)
	S4 - Southern and coast prairie region, region west of the Brazos River	(9)
	S5 - Central black prairie region	(11)
	S11 - Unorganized counties	(6)-(7)

Define a new variable BEST = ΣS_i where the index i runs over those soil types whose coefficients rank in the top half of the magnitude-ranking of the coefficients. The variable BEST is 1 for a county whose soil belongs to the most fertile half of the soil types. Define REST = $\Sigma\ S_i$ for the remainder of the soil type categories. [Note: In cases where there was an odd number (2N+1) of soil types, the BEST category was taken to be N soil types with the largest estimated coefficients -- 2 out of 5 S_i classifications, 3 in the case of 7 S_i, etc.]

It is well-known that (omitting county observation subscripts) an equation $y = \beta_1 BEST + \beta_2 REST + u$, when estimated by least squares, yields $\hat{\beta}_1 = \bar{y}$ for the counties belonging to the BEST soil type classification, while $\hat{\beta}_2 = \bar{y}$ over the rest of the counties. This is easily seen by calculating the least squares estimates.

$$\hat{y}_i = \hat{\beta}_1 (BEST)_i + \hat{\beta}_2 (REST)_i$$

Define $X_i = (BEST)_i$; $Z_i = (REST)_i$ for convenience of notation.

$$e_i^2 = (y_i - \hat{y}_i)^2 = (y_i - \hat{\beta}_1 X_i - \hat{\beta}_2 Z_i)^2$$

$$E = \sum e_i^2$$

First-order conditions for a minimum sum of squares are:

$$\frac{\partial E}{\partial \hat{\beta}_1} = \sum_i 2(y_i - \hat{\beta}_1 X_i - \hat{\beta}_2 Z_i) \cdot X_i = 0$$

$$\frac{\partial E}{\partial \hat{\beta}_2} = \sum_i 2(y_i - \hat{\beta}_1 X_i - \hat{\beta}_2 Z_i) \cdot Z_i = 0$$

From the first of these conditions:

$$\sum_i (y_i X_i - \hat{\beta}_1 X_i^2) = 0 \qquad \text{since } X_i Z_i = 0 \text{ for all } i$$

But $X_i^2 = 1$ when $X_i = 1$ and $X_i^2 = 0$ when $X_i = 0$. So if n_1 = the number of counties whose soils are in the "best" category:

$$\sum_{i \,\varepsilon\, \text{BEST}} y_i - n_1 \hat{\beta}_1 = 0$$

$$\hat{\beta}_1 = \frac{1}{n_1} \sum_{i \,\varepsilon\, \text{BEST}} y_i$$

Similarly:

$$\hat{\beta}_2 = \frac{1}{n_2} \sum_{i \,\varepsilon\, \text{REST}} y_i$$

Hence $\hat{\beta}_1$ and $\hat{\beta}_2$ are the "group means" of the variable y_i for its values when considering the counties with the "best" soils and with the "rest" of the soils respectively.

One further transformation will simplify the subsequent tests. BEST + REST = 1 for each county, or REST = 1 - BEST. So:

$$\begin{aligned} y &= \beta_1(\text{BEST}) + \beta_2(\text{REST}) + u \\ &= \beta_1(\text{BEST}) + \beta_2(1\text{-BEST}) + u \\ &= \beta_2 + (\beta_1 - \beta_2)(\text{BEST}) + u \end{aligned}$$

Therefore ordinary least squares estimates of

$$y = \psi_0 + \psi_1(\text{BEST}) + u$$

will give as ψ_1 the difference in means of the variable y between the

two groups of counties. The t-statistic associated with the estimate of ψ_1 will test the significance of this difference of means.

Obviously exactly the same transformations could be performed to test the significance of the difference of means for any other variable between any other mutually exclusive and exhaustive classification of the counties into two groups.

The following tables show the differences in means and associated t-statistics both for the proportion of acres planted in cotton and for the proportion of blacks in the total population. It should be noted again that the over-all "best" and "rest" soil type categories are the same for every state in the Group I and Group II regressions except North Carolina, for which the different results are both reported.

Group I and Group II Regressions, Over-all Best Soils

$(\overline{H/T})_{BEST} - (\overline{H/T})_{REST}$

State	1880	1890	1900	1910
North Carolina				
Group I:	.0804	.0825	.0826	.0922
[t]	[3.318]	[3.332]	[4.165]	[3.650]
Group II:	.0311	.0288	.0175	.0298
	[1.246]	[1.129]	[.837]	[1.138]
South Carolina	.000994	.00420	-.0368	.0372
	[.0233]	[.0927]	[-.830]	[1.027]
Georgia	-.0186	.00837	-.0413	-.0147
	[-.745]	[.353]	[-1.643]	[-.563]
Florida	-.0861	-.0863	-.0561	-.116
	[-2.208]	[-2.292]	[-1.765]	[-4.010]
Tennessee	.138	.131	.113	.131
	[7.222]	[6.815]	[6.312]	[6.319]
Alabama	-.00427	-.00678	-.0383	-.0541
	[-.141]	[-.274]	[-1.371]	[-.830]
Mississippi	.0157	.0261	.0158	.0526
	[.458]	[.733]	[.483]	[1.729]
Arkansas	-.0156	.00395	-.0111	.0342
	[-.469]	[.100]	[-.316]	[.946]
Louisiana	-.0746	-.107	-.0665	-.0782
	[-1.283]	[-1.970]	[-1.407]	[-2.548]
Texas	.100			-.0309
	[5.824]			[-1.224]

Group I and Group II Regressions, Over-all Best Soils

$(\overline{B/R})_{BEST} - (\overline{B/R})_{REST}$

State	1880	1890	1900	1910
North Carolina				
Group I:	.122	.110	.115	.101
[t]	[3.116]	[2.846]	[3.016]	[2.534]
Group II:	-.0258	-.0336	-.0183	-.00280
	[-.643]	[-.853]	[-.471]	[-.0693]
South Carolina	.152	.146	.150	.119
	[2.508]	[2.247]	[2.529]	[2.288]
Georgia	.0939	.142	.164	.152
	[2.460]	[3.727]	[4.260]	[4.222]
Florida	-.151	-.177	-.129	-.0706
	[-2.014]	[-2.702]	[2.022]	[-1.313]
Tennessee	.123	.131	.137	.130
	[4.210]	[4.628]	[4.766]	[4.585]
Alabama	-.0973	-.0764	-.0674	-.0541
	[-1.532]	[-1.169]	[-1.008]	[-.830]
Mississippi	.0564	.0687	.0821	.0907
	[1.101]	[1.262]	[1.503]	[1.739]
Arkansas	-.0196	.00714	.0130	.0233
	[-.339]	[.115]	[.204]	[.379]
Louisiana	.151	.165	.143	.107
	[3.033]	[3.098]	[2.610]	[2.071]
Texas	.132			.109
	[5.368]			[5.395]

APPENDIX 6

A TEST OF SIGNIFICANCE OF THE SUM OF VALUES OF CUMULATIVE DISTRIBUTION FUNCTIONS

The derivation of this test is elementary, but it still seems to be useful in situations such as the one in the text, when a group of test statistics taken together proves to be significant even when some of them taken individually are not, and the number of test statistics involved is too small to allow straightforward application of the Central Limit Theorem.

In the derivations that follow, the X_i are independent random variables distributed uniformly over the interval 0 to 1. These X_i can be interpreted as values of the cumulative distribution function of any continuous random variable [1]. In the examples of Chapters IV and V, the X_i represent areas under the appropriate F density functions to the left of the calculated F values for each state in each census year. In the notation of those chapters X_i = 1 - P-value for each test.

Consider first the case of two such variables. Let

$$y_1 = X_1$$
$$y_2 = X_1 + X_2$$

The probability density function of y_2 is to be found. The change-of-variable technique [2] will be employed.

$$X_1 = y_1$$

and

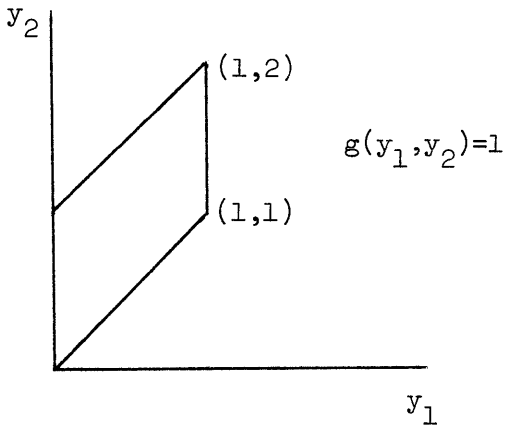
$$X_2 = y_2 - y_1$$

The appropriate Jacobian for the change of variables equals 1, and if f and g are the joint density functions of X_1 and X_2 and of y_1 and y_2 respectively, then $g(y_1,y_2) = 1 \cdot f(X_1,X_2)$ over the appropriate region. X_1 and X_2 are independently distributed uniform random variables over 0,1; hence $f(X_1,X_2) = 1$ over the unit square in the X_1, X_2 plane. This region corresponds in the y_1, y_2 plane to

$$0 < y_2 \leq 1;\ 0 \leq y_1 \leq y_2$$

and

$$1 < y_2 \leq 2;\ y_2 - 1 \leq y_1 \leq 1$$



Thus the marginal density function h of y_2 alone is given by:

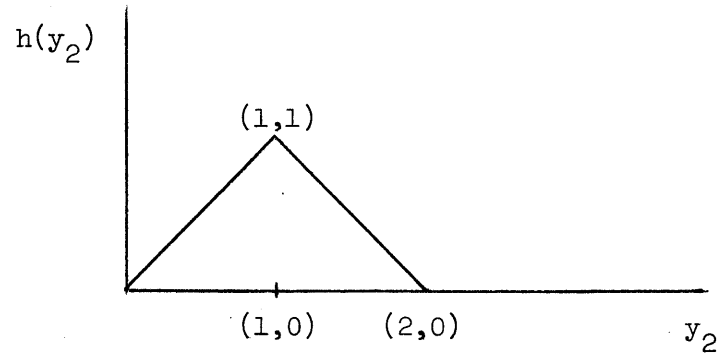
$$h(y_2) = \int_0^{y_2} 1 \cdot dy_1 \qquad 0 < y_2 \leq 1$$

$$h(y_2) = \int_{y_2-1}^{1} 1 \cdot dy_1 \qquad 1 < y_2 \leq 2$$

So that:

$$h(y_2) = y_2 \qquad 0 < y_2 \leq 1$$

$$= 2 - y_2 \qquad 1 < y_2 \leq 2$$



The same approach can be applied to larger numbers of variables. Consider three uniformly distributed variables, X_1, X_2 and X_3. Let

$$y_1 = X_1 \qquad X_1 = y_1$$
$$y_2 = X_1 + X_2 \qquad X_2 = y_2 - y_1$$
$$y_3 = X_1 + X_2 + X_3 \qquad X_3 = y_3 - (y_2 - y_1) - y_1 = y_3 - y_2$$

The Jacobian for the change of variables is again equal to one. To simplify notation let g indicate the joint or marginal density functions of the argument variables.

So $g(y_1,y_2,y_3) = 1$ over the appropriate region in y_1, y_2, y_3 space. To find $g(y_3)$ it is first necessary to find $g(y_2,y_3)$:

$$g(y_2,y_3) = \int_0^{y_2} g(y_1,y_2,y_3)dy_1 \qquad \text{when} \quad 0 < y_2 \leq 1$$
$$= \int_{y_2-1}^{1} g(y_1,y_2,y_3)dy_1 \qquad \text{when} \quad 1 < y_2 \leq 2$$

By reasoning analogous to that preceding, the range of y_1 and y_2 must be the same as in the 2-variable case. Therefore:

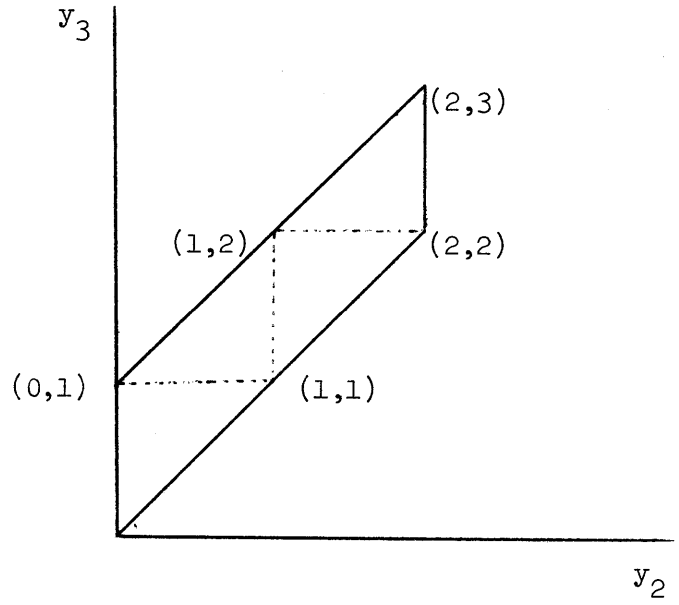
$$g(y_2,y_3) = y_2 \qquad 0 < y_2 \leq 1$$
$$= 2 - y_2 \qquad 1 < y_2 \leq 2$$

All that remains is to describe the range of y_2 and y_3. This is easy to do:

If $0 < y_3 \leq 1$, $0 < y_2 < y_3$

If $1 < y_3 \leq 2$, $y_3 - 1 < y_2 < y_3$

If $2 < y_3 \leq 3$, $y_3 - 1 < y_2 < 2$



Therefore:

$$g(y_3) = \int_0^{y_3} y_2 \, dy_2 = \frac{y_3^2}{2} \qquad \text{when} \quad 0 < y_3 \leq 1$$

$$g(y_3) = \int_{y_3-1}^{1} y_2 \, dy_2 + \int_1^{y_3} (2 - y_2) dy_2 \qquad \text{when} \quad 1 < y_3 \leq 2$$

$$= \frac{y_2^2}{2} \Bigg|_{y_3-1}^{1} + \left(2y_2 - \frac{y_2^2}{2}\right) \Bigg|_1^{y_3}$$

$$= \frac{1}{2} - \frac{(y_3 - 1)^2}{2} + 2y_3 - \frac{y_3^2}{2} - 2 + \frac{1}{2}$$

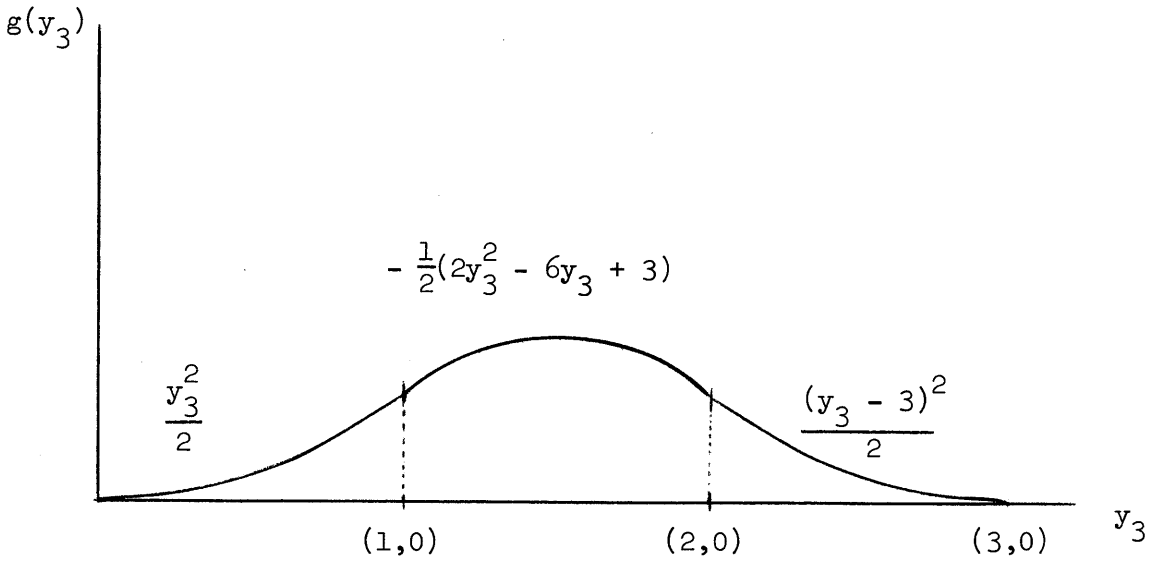
$$= -\frac{1}{2}(2y_3^2 - 6y_3 + 3) \qquad \text{when} \quad 1 < y_3 \leq 2$$

and

$$g(y_3) = \int_{y_3-1}^{2} (2 - y_2)dy_2 \qquad \text{when} \quad 2 < y_3 \leq 3$$

$$= \frac{1}{2}(y_3 - 3)^2$$

So the probability density function of y_3 is given by:



The derivation can be checked by calculating the total area under the curve (which equals one) and the maximum value of the middle section (which occurs at $1\frac{1}{2}$). Also, the segments of the function actually meet at $y_3 = 1$ and $y_3 = 2$.

Finally consider the case of four variables. The procedure is by now familiar, so the steps will be abbreviated:

$$y_1 = X_1 \qquad X_1 = y_1$$

$$y_2 = X_1 + X_2 \qquad X_2 = y_2 - y_1$$

$$y_3 = X_1 + X_2 + X_3 \qquad X_3 = y_3 - y_2$$

$$y_4 = X_1 + X_2 + X_3 + X_4 \qquad X_4 = y_4 - y_3$$

Jacobian = 1

$$g(y_2, y_3, y_4) = y_2 \qquad 0 < y_2 \leq 1$$

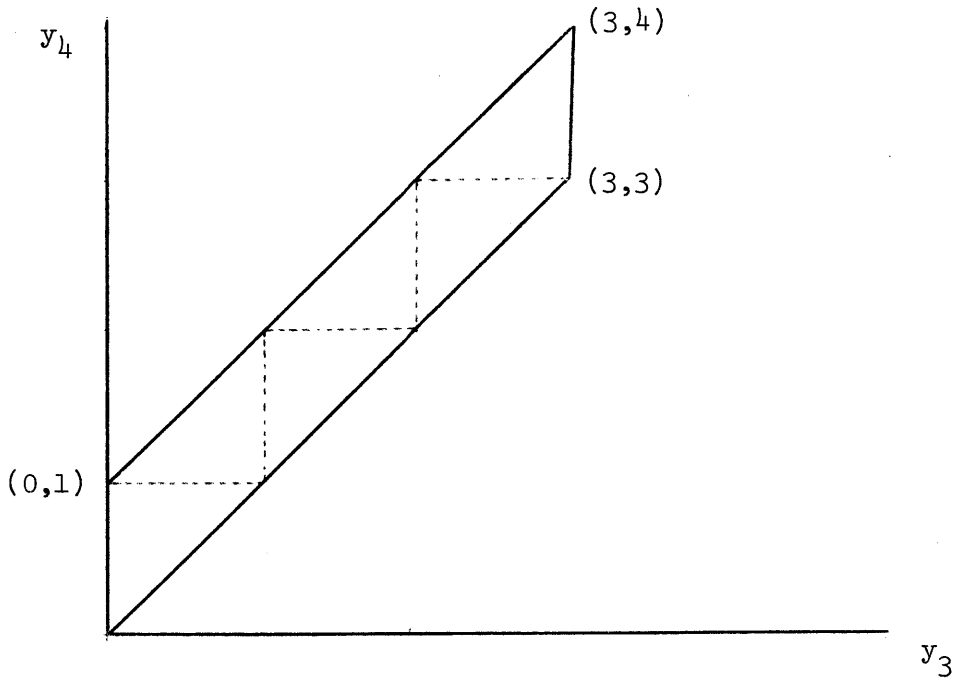
$$= 2 - y_2 \qquad 1 < y_2 \leq 2$$

$$g(y_3, y_4) = \frac{y_3^2}{2} \qquad 0 < y_3 \leq 1$$

$$= -\tfrac{1}{2}(2y_3^2 - 6y_3 + 3) \qquad 1 < y_3 \leq 2$$

$$= \frac{(y_3 - 3)^2}{2} \qquad 2 < y_3 \leq 3$$

The relevant region in y_3, y_4 space is:

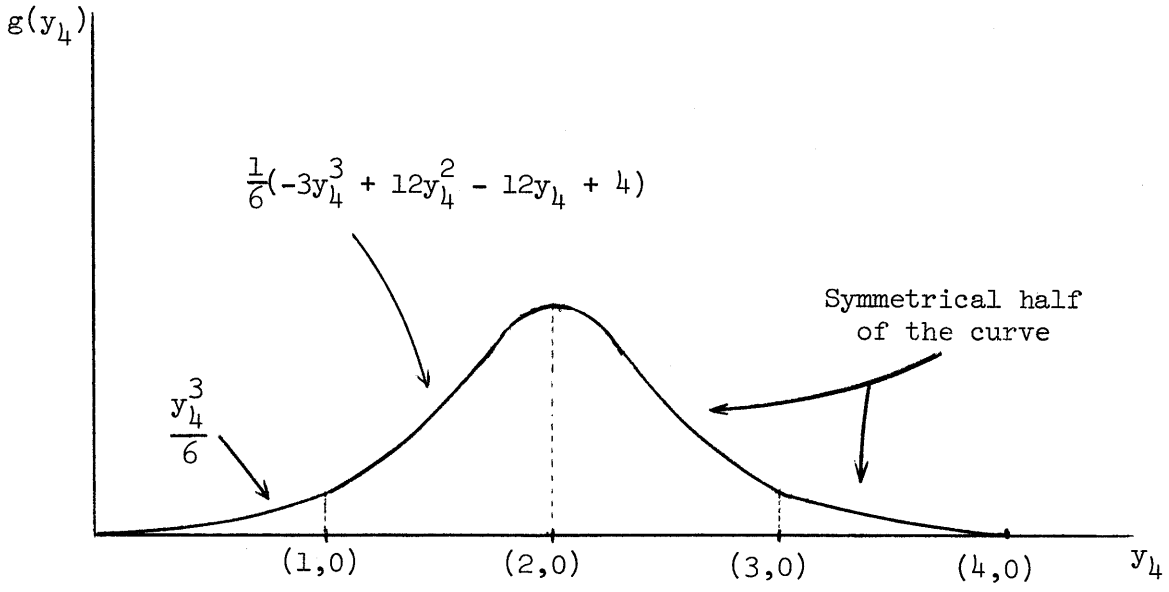


$$g(y_4) = \int_0^{y_4} \frac{y_3^2}{2}\, dy_3 = \frac{y_4^3}{6} \qquad \text{when} \quad 0 < y_4 \leq 1$$

$$g(y_4) = \int_{y_4-1}^{1} \frac{y_3^2}{2} + \int_1^{y_4} -\tfrac{1}{2}(2y_3^2 - 6y_3 + 3)\, dy_3 \qquad \text{when} \quad 1 < y_4 \leq 2$$

$$= \frac{1}{6}\,(-3y_4^3 + 12y_4^2 - 12y_4 + 4)$$

Rather than continue the somewhat laborious computation, it is sufficient to observe that the probability density function is symmetric around $y_4 = 2$.



Calculation of any area under the density function is merely a matter of integration, but the area of concern here is the area from $y_4 = 3$ to $y_4 = 4$. This area equals the probability that the sum of 4 P-values will be less than or equal to one. The area is:

$$A = \int_0^1 \frac{y_4^3}{6}\, dy_4 = \frac{y_4^4}{24}\Big|_0^1 = \frac{1}{24} = .042 < .05$$

This is the result used in the text.

NOTES TO APPENDIX 6

[1] Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics (Second Edition) (New York: The Macmillan Company, 1965), 178.

[2] Ibid., 115-25.

APPENDIX 7

CRITICISMS AND RESERVATIONS

There are several issues that need to be raised in order to achieve a completely balanced assessment of the methodology and results of this study. These objections and criticisms do not by any means invalidate the conclusions drawn in the main body of the text, but they do reinforce the commonplace that the results of any empirical study are only as good as the data and the assumptions upon which they are based. Also, by illustrating precisely the nature of any biases infecting the estimates, it is possible to form a better judgment regarding their usefulness in interpreting Southern economic history. Several objections will be considered.

(1) Arbitrary sample delimitation. The choice of single states and single census years as the samples of counties from which the production functions were estimated was partly arbitrary and partly dictated by the nature of the data. Since the variables' definitions were prone to change from Census to Census, any pooling of data over time would have been subject to severe errors of measurement. On the other hand, there is no intrinsic reason why larger sample regions than the individual states could not have been chosen. Chow-type F-tests could have been employed to determine whether several state cross-sections could have been pooled, but these tests were not done. The state sample regions were used primarily because of the ease of describing the results in terms of the "natural" political units.

In conjunction with this decision, many statistical tests were performed on the signs or values of parameters from the sample of regressions, in order to discern over-all trends and region-wide tendencies. The tests on the sample of coefficients require the independence of the coefficient estimates from year to year and state to state under null hypotheses typically tested--that no significant pattern was present in the coefficients or their signs. Given the arbitrary choice of single states in single census years as the data sets for each regression, the assumption of independence may not be plausible. Rejection of the null hypotheses of no pattern in the coefficients led to acceptance of the simplest alternative: that the preponderance of signs indicated the true direction of a systematic pattern. This was not the only possible alternative hypothesis, however. In particular, more complicated alternative hypotheses involving the failure of the independence assumption could have been accepted on the basis of the findings.

The basic point here is that, given the mass of data contained in the Census cross-sections, there are several methods available for processing it and casting it into tractable groupings. The method chosen in the text is only one such method, and was somewhat arbitrary at that.

(2) Errors of measurement in the labor force variables. In order to interpret the difference b-a as a race-associated productivity difference, it is necessary that the variables W and B actually measure the labor input attributable to the two groups of agricultural workers, whites and blacks. There are two reasons why this might not be the case:

(a) There might have been a systematic difference in the participation rates of the two races. For example, if blacks were discriminated against and paid lower wages than whites, the black participation rate might have been higher than the corresponding white rate, in order for the black families living at the edge of subsistence to be able to survive. Thus a given number of rural black inhabitants would be providing a larger amount of labor than the same number of white rural inhabitants. In this case a positive value of b-a might not indicate any productivity difference: only a difference in the participation rates, with blacks having the higher rate.

(b) If there was a systematic difference in the quality or intensity of labor provided by workers under various tenure arrangements, and if these tenure arrangements were systematically associated with racial differences (as, for example, a positive correlation between the incidence of tenant farming and of black agricultural workers), then a significant b-a might reflect only this labor intensity difference.

Similar objections could be raised regarding the labor input measurements in the Group II model. This measurement error associated with the use of total rural population as a measure of labor input might explain a pattern to the sign of b-a, but it is hard to see how it could account for the systematic regional differences which were found. As in the case of the simple "legacy of slavery" idea, it is difficult to see how a participation-rate explanation of the sign of b-a could account for b-a positive in the Periphery, negative in the Cotton Belt; or how participation rates alone could explain the over-all productivity

ranking based on the Group II results, showing whites occupying the top and bottom of the productivity scale.

(3) Possible bias in the relative crop productivity estimates. It might be argued that the strength of the cotton-associated productivity advantage was overestimated because not all improved acres were farmed with equal intensity. The difference in intensity could be due to greater labor requirements per acre for cotton culture than for other crops. Also, the Census definition of improved acres included lands lying fallow and used for grazing, lands which may not have been worked as intensively as cotton acres. (See Appendix 3.)

The labor intensity argument is probably not too serious, since the labor input is explicitly included in the production function. Even if cotton required more labor per acre, it is hardly likely that a cotton farmer worked harder than a grain farmer. Any extra labor requirements should be reflected in a greater population in cotton counties.

The possible error in using improved acres as the land input is potentially more serious. To meet the objections, both the Group I and Group II production functions were estimated, replacing T = improved acres by T = total acres planted in corn, wheat, oats and cotton. The results of these estimations were designated Group I-PA and Group II-PA respectively (PA designating "planted acres" rather than improved acres.) In the Group I-PA regressions, the coefficient of H/T would tend to underestimate any potential cotton productivity advantage, because in addition to the output of the four crops, the total

agricultural output of each county included the output of other crops and the excess of the value of animal products over the value of the corn and oats consumed by the livestock. Animals increased in value due to their consumption of other grains, their grazing on improved acres not counted in this definition of T, and their natural biological increase of growth and reproduction. The total acreage planted to the four major crops underestimates the input of non-cotton land; hence the coefficient d will tend to be overestimated in the regressions because of the measurement error in the non-cotton land input.

The results of the Group I-PA and Group II-PA regressions are not very different from the Group I and Group II results. The average input elasticities are hardly changed, so the conclusions regarding exploitation and returns to scale need not be touched. As expected, the cotton productivity advantage is not as pronounced. It is still unmistakable, however. Out of 38 estimated coefficients of H/T in the Group I-PA equations, 28 are positive. If the sign of this coefficient were a random variable with equal probability of being positive or being negative, the probability of 28 or more positive signs would be approximately:

$$\Pr\left[Z \geq \frac{28 - 19}{\sqrt{38 \cdot \frac{1}{2} \cdot \frac{1}{2}}}\right] = \Pr(Z \geq 2.92) \cong .002$$

where Z is the standard normal variable, using the normal approximation to the binomial. Such a sign distribution is highly unlikely, even considering that the test employed was a one-tailed test. In this

specification the t-statistic of the coefficient of H/T was greater than 2 in 18 of 38 cases, and greater than 1 in 26 of 38 cases. In none of the cases in which the coefficient was negative was the absolute value of the t-statistic greater than 1. Thus, even measuring the cotton and non-cotton land inputs in such a way as to bias the results strongly against indicating a cotton productivity advantage, the advantage was still apparent.

Similarly, the advantage in productivity of white cotton farmers over black cotton farmers is weakened by the re-definition of "total" acres in the Group II-PA results, although every other pattern found in the Group II tables was essentially unchanged.

Four-Census Averages -- Group I-PA Results

State	α	β	γ	ν
North Carolina	.405	.290	.326	1.021
South Carolina	.303	.335	.309	.947
Georgia	.460	.315	.276	1.051
Florida	.322	.141	.479	.942
Tennessee	.241	.402	.347	.990
Alabama	.462	.473	.166	1.101
Mississippi	.310	.279	.395	.984
Arkansas	.254	.361	.377	.992
Louisiana	.356	.214	.355	.925
Texas	.121	.490	.495	1.106
Over-all	.323	.330	.353	1.006

Four-Census Averages -- Group II-PA Results

State	α	β	γ	ν
North Carolina	.417	.292	.309	1.018
South Carolina	.316	.338	.289	.943
Georgia	.413	.398	.256	1.067
Florida	.290	.126	.479	.895
Tennessee	.242	.401	.345	.988
Alabama	.445	.474	.175	1.094
Mississippi	.312	.282	.394	.988
Arkansas	.249	.366	.383	.998
Louisiana	.337	.212	.360	.909
Texas	.118	.490	.499	1.107
Over-all	.314	.338	.349	1.001

Coefficients of H/T with Associated t-Statistics

Group I-PA Regressions

State	1880	1890	1900	1910
North Carolina	.610	-.133	.168	.297
[t]	[3.289]	[-.629]	[1.018]	[1.784]
South Carolina	.162	-.253	.768	1.438
	[.326]	[-.471]	[2.035]	[5.525]
Georgia	.546	1.065	.360	.390
	[2.082]	[5.028]	[1.770]	[2.635]
Florida	1.385	1.339	1.464	1.416
	[2.098]	[3.014]	[3.785]	[3.204]
Tennessee	.785	-.0509	-.148	-.218
	[2.908]	[-.262]	[-.604]	[-.998]
Alabama	2.431	.284	.394	.335
	[7.182]	[1.133]	[1.732]	[1.481]
Mississippi	1.375	.211	.854	.782
	[2.426]	[.467]	[4.172]	[2.586]
Arkansas	1.914	.967	.845	.778
	[10.928]	[7.276]	[4.766]	[5.910]
Louisiana	-.236	-.262	-.237	.654
	[-.592]	[-.957]	[-.547]	[1.992]
Texas	-.695			-.000288
	[-.645]			[-.00216]

Coefficients of B/R, with Associated t-Statistics,

Group I-PA Regressions

State	1880	1890	1900	1910
North Carolina	.764	.554	.661	.774
[t]	[4.320]	[3.024]	[4.715]	[4.624]
South Carolina	.597	.308	-.306	-.514
	[1.995]	[.933]	[-1.910]	[-3.391]
Georgia	.0184	.303	-.119	.111
	[.144]	[3.071]	[-1.506]	[1.704]
Florida	-.440	-.437	-.499	-.133
	[-1.124]	[-1.109]	[-1.597]	[-.254]
Tennessee	.313	.463	.114	.231
	[1.646]	[2.816]	[.623]	[1.215]
Alabama	-.718	.108	-.132	-.305
	[-3.679]	[.778]	[-1.209]	[-3.095]
Mississippi	-.213	.734	-.131	-.222
	[-.628]	[2.872]	[-1.407]	[-1.921]
Arkansas	-.539	.218	-.0533	-.290
	[-3.768]	[1.953]	[-.416]	[-2.982]
Louisiana	1.133	.971	.399	.0550
	[2.697]	[4.071]	[1.642]	[.227]
Texas	.709			.706
	[.859]			[2.005]

Sign Patterns for Group II-PA Regressions

State		1880	1890	1900	1910
North Carolina	x y	+ +	+ +	+ -	+ +
	x+z	-	-	+	+
	y+z	-	-	+	-
South Carolina		+ +	+ +	- +	- +
		-	-	-	-
		-	-	+	+
Georgia		+ +	+ +	+ +	- +
		-	-	-	+
		-	+	-	+
Florida		- -	- +	- +	+ +
		+	+	+	-
		+	+	+	+
Tennessee		+ +	+ -	+ -	+ -
		+	+	+	-
		+	+	-	-
Alabama		- +	+ +	- +	- +
		-	-	+	-
		+	-	+	+
Mississippi		+ +	+ +	- +	- +
		-	+	+	-
		+	+	+	+
Arkansas		+ +	- +	- +	- +
		-	+	+	-
		+	+	+	+
Louisiana		+ +	+ -	- -	- -
		+	+	+	+
		-	+	+	+
Texas		+ -			+ +
		+			+
		-			-

Group II-PA Results, Sign Frequencies

1880-1910, All South

	+	-	
x	22	16	BN (>) WN
y	29	9	WC (>) WN
x+z	20	18	WC (=) BC
y+z	25	13	BC (>) BN

1880-1890, All South

x	15	4	BN (>) WN
y	15	4	WC (>) WN
x+z	9	10	WC (=) BC
y+z	11	8	BC (=) BN

1900-1910, All South

	+	-	
x	7	12	BN (<) WN
y	14	5	WC (>) WN
x+z	11	8	WC (=) BC
y+z	14	5	BC (>) BN

South Carolina + Georgia + Alabama + Mississippi + Arkansas + Louisiana, 1880-1910

	+	-	
x	11	13	BN (=) WN
y	21	3	WC (>) WN
x+z	10	14	WC (≥) BC
y+z	18	6	BC (>) BN

North Carolina + Tennessee + Texas + Florida, 1880-1910

	+	-	
x	11	3	BN (>) WN
y	8	6	WC (=) WN
x+z	10	4	BC (>) WC
y+z	7	7	BC (=) BN

This last case of the results for the Periphery is the only one of the sub-regional and sub-period breakdowns in which the actual ranking of the productivities is different from that of the Group II results. It can be seen that in all the Group II-PA results white cotton farmers appear to have "lost" in productivity, but that the over-all ranking of the productivities of the different groups of farmers is essentially unchanged. White cotton farmers are still generally among the most productive farmers, other white farmers among the least productive; with blacks in between and with black cotton farmers generally more productive than black non-cotton farmers.

The insensitivity of the main conclusions to such a major change in the variable definitions is important. The acreage planted to corn,

wheat and oats greatly underestimated the land input to agricultural products other than cotton. Nevertheless the cotton productivity advantage continued to show through clearly, despite the fact that the estimate of c-d was biased downward by the measurement error. Similarly, with some weakening of the productivity advantage to white cotton farmers, the basic productivity rankings of the Group II model were again found in most cases. The most important conclusions of all, those regarding exploitation and the marginal product of labor, were unchanged. For these reasons the results reported in the text on crop-associated productivity cannot be too far wrong at worst. Total improved acres is a priori a better measure of the land area input than the acreage planted to the four crops, and even the severest sort of bias deliberately introduced fails to eradicate the comparative advantage of cotton in the South.

(4) The Taylor series approximation. Only the linear approximations of the production functions were estimated. It was shown earlier (see Chapter IV) that these linear approximations were better approximations the smaller the productivity differences between the different types of land and labor employed. It would have been ideal to perform non-linear estimations of the production functions, or alternatively to include more terms of the Taylor series expansions in the equations finally fitted. The fact that the linear approximations fitted well and revealed significant patterns in the coefficient signs is really the only justification for not attempting the non-linear

estimations. Of course, given the massive amount of data involved, the computational problems involved in non-linear estimation would have been severe.

(5) Alternative parameterizations of the Overproduction Hypothesis in the cotton supply functions. It is usually the case in parameterizing a somewhat vague collection of ideas such as the Overproduction Hypothesis that more than one model may be taken as a fair representation of the hypothesis. For example, in using the farmers' speed of adjustment and price-responsiveness to distinguish between the lock-in and rational crop choice possibilities, it was assumed in the text that farmers' responses were symmetrical with respect to either rising or falling prices. The magnitudes of the respective speeds of adjustment and price elasticities were then taken as indicative of the flexibility of the farmers in making crop selection decisions. This is not the only possible specification, however. A plausible version of the Lock-in Hypothesis might be that farmers were able to shift rapidly into cotton culture when the (expected) relative cotton price was rising, but that they were not so able to shift out of it when the (expected) price was falling. Alternatively such a specification might involve two different speeds of adjustment, one appropriate for years in which the desired acreage (or share of acres) in cotton was greater than the previous year's actual acreage (or share), and the other applying to years in which desired share was smaller than the previous year's actual share. If such a specification were closer to the truth than the symmetrical adjustment of the model actually used, relatively high speeds of adjustment might be

merely a reflection of a greater number of years of increasing cotton prices than of decreasing cotton prices.

This is not the only possible variant in parameterizing the Lock-in Hypothesis. The trend variable in the cotton supply function may actually be a proxy for some other variable or for a structural change in the pattern of supplier behavior, different from the "pure" trend as which it is interpreted in the text. For example, in an earlier version of the supply model [1] the trend was replaced by a "tenancy-trend" variable constructed by linear interpolation between the census years of the percent of farms operated by tenants of all kinds. Because of the strong trend component in this variable, the estimated supply functions including it were very similar to those with a pure trend. In particular, the ranges of long and short-run price elasticities and speeds of adjustment were roughly the same. This earlier version of the model was employed at the outset of the research, when this investigator was convinced of the validity of the Lock-in Hypothesis a priori. Tenancy was included as a proxy for merchants' control of the planting decisions. The argument presented in that earlier paper was that the tenancy-trend proxy picked up all lock-in effects, so that the estimated elasticities and speeds of adjustment should not have been radically different from similar values for Western wheat farmers. The tenancy-trend coefficient was positive for every state in the A_t (total cotton acreage) model, and was positive in 7 of 10 states in the S_t (share of total acreage in cotton) model. These results were interpreted as indicating merchants' pressure for cotton cultivation. However it was pointed out

at the 1971 Cliometrics Conference in Madison, Wisconsin, that the link between the tenancy-trend variable and any meaningful measure of merchant control was nebulous at best [2]. The theoretical results of Chapter III undermined every link between tenure and other variables, and the production function estimates further reduced expectation a priori of a lock-in effect. The interpretation of the supply function estimates proposed in the text is both simpler and more consistent with the other strong results than any complicated interpretation based on tenancy. This is an appropriate opportunity to reject the tentative conclusions of the earlier version of the supply model.

This list of objections is not complete by any means. All things considered, it would seem that the objections do not seriously call into question any of the important conclusions in the body of the text. At least the burden of proof now rests with adherents to the hypotheses rejected as a result of analysis of the estimates.

NOTES TO APPENDIX 7

[1] Stephen DeCanio, "Tenancy and the Supply of Cotton in the South: 1882-1914," unpublished paper presented at Cliometrics Conference in Madison, Wisconsin, April 3, 1971.

[2] Particularly enlightening was the discussion of Claudia Goldin and the comments of Richard Sutch.

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